

## Research Article

### Prevalence and Associated Risk Factors of HCV Infection Among Children in Lahore, Pakistan

Abdul Majeed Akhtar,<sup>1</sup> Sufia Majeed,<sup>2</sup> Wasif Majeed,<sup>3</sup> Tahira Ashraf,<sup>4</sup> Shamsa Kanwal<sup>5</sup>

<sup>1,4,5</sup>University Institute of Public Health, The University of Lahore; <sup>2</sup>Women Medical OPD, Mayo Hospital Lahore;

<sup>3</sup>The University of Punjab, Lahore

#### Abstract

**Background:** Pakistan has second highest prevalence of HCV in the world. The epidemiology and burden of HCV infection varies in people of different ages.

**Objective:** Present study was designed to measure the prevalence of HCV among children in selected public and private hospitals of Lahore.

**Methods:** Children in the study were screened for anti-HCV test through ELISA (third generation ELISA Kit and Qaigen kit) for detecting the viral load from June 2018 to May 2019.

**Results:** Children in the study were screened for anti-HCV test through ELISA (third generation ELISA Kit and Qaigen kit) for detecting the viral load. The average age of non-reactive and reactive children was  $7.28 \pm 3.36$  and  $5.50 \pm 3.8$  years respectively. Socio-economic status was found associated with anti-HCV. An association was found significant for birthplace, delivery assisted by, and type of milk given to the child.

**Conclusion:** This study shows that the prevalence of HCV is 3.85% in children in Lahore city of Pakistan, which is alarming situation for healthcare providers, researchers and policy makers.

**Corresponding Author** | Dr. Abdul Majeed Akhtar, University Institute of Public Health, The University of Lahore

**Email:** abdulmajeedakhtar@gmail.com

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#### Introduction:

World Health Organization (WHO) has declared Hep (B) and (C) virus as a major public health issue with alarmingly high prevalence of 3.5%.<sup>1</sup> Literature has reported that prevalence of anti-HCV has jumped from >122 millions to an astonishing >257 millions over a short period of time.<sup>2</sup> The status of Hep (C) is not less than that of an epidemic as it has effected more than 10 million people around the world.<sup>3</sup> The literature reports its prevalence varying from 4.8% - 14% recently.<sup>3,4</sup> In pregnant women, its prevalence is 8% while in children it is between 0.5%-5%.<sup>5,6,7</sup> High HCV prevalence among pregnant women (10.84%)

was shown in a study conducted in Lahore, Pakistan.<sup>8</sup> Annual deaths due to HCV in Pakistan are approximately fifty thousand.<sup>9</sup>

The possibility of blood or blood products related transfusion of HCV could not be overlooked in Pakistan. One study conducted on blood donors in Lahore by Akhtar et.al, documented the prevalence 17.78% by Elisa method.<sup>10</sup> It is therefore mandatory to screen all the children that get born to mothers with the infection, or those who are transfused with contaminated or un-screened blood. Among the HCV infected children, 25% spontaneously clear the virus while 75% progress to end stage liver disease.<sup>11</sup> Vertical transmission has

become the leading cause of childhood HCV infection. Also, those children who have had a long term transfusion history are inevitably at higher risk of contracting the disease.

The aim of this study was to find the frequency of Hep (C) virus infection in children aged less than 12 years registered at selected hospitals (both private and public) in Lahore. The associated risk factors of HCV infection are also discussed, and the different genotypes of HCV through RT-PCR are determined as well as prevalent subtype was found during the study period.

## Methods

This study was designed to find the frequency of Hep (C) virus infection in children aged less than 12 years registered at the OPDs of Lahore General, Sir Ganga Ram, Mayo, Services and Jinnah Hospitals in domain of government hospitals, whereas, from two private hospitals including Farooq and Ghurki Trust Hospitals as well. This inclusion of sample from both public & private sector was done to ensure inclusiveness and prevent bias. The number of patients included from both setups included equal numbers of patients who were administered with Anti - HCV antibodies using the test called ELISA through 3rd Gen ELISA kit.<sup>12</sup>

For identification of several genotypes of Hep (C), RT (PCR) was used for storage of anti – HCV serum that were positive as well as Qaigen-kit was utilized for assessment of viral load. SPSS v. 16 was used for data entry and analysis. Mean and standard deviation was used for quantitative variables, while, frequency and percentage was used for qualitative variables. Chi square test was applied to see association, whereas, t-test was used to compare means of two independent groups. Odds Ratio was used for risk assessment keeping p-value of less than 5% as significant.

## Results

Study showed very alarming results and found that a considerable number of patients had Hep (C), and were at high risk of impediment. Total number of children included in this study were 208, all below 12 years of age, who tested positive for Hep (C). Among all, 8(3.85%) proved to be reactive with anti – HCV test. The average age of children in reactive and the non reactive groups of children  $5.50 \pm 3.81$  years and  $7.28 \pm 3.36$  years as indi-

cated in Table-1. Among these, 5 males and 3 females were present. No statistical association was found between anti – HCV and father's occupation and the age. Study showed statistical association of socio-economic status with the status of anti – HCV (p-value < 0.05).

Table 2 shows no children caught the infection through

**Table 1:** Distribution of Hepatitis C Virus reactive & Non-reactive children less than 12 year of age according to Demographic characteristics from public & Private Hospitals of Lahore Metropolitan

Demographic Characteristics	Anti HCV Status		P-value	Odds Ratio	Confidence Interval
	Re-active	Non-Reac-tive			
Gender	Male	5	121	0.901	1.088
	Female	3	79		
Father's Occupational Status	Public Job	1	14	0.674	1.59
	Private Job	7	156		
	Unemployed	0	30		
Socio Economic Status	5000-10000	2	141	0.015	0.132
	11000-20000	6	56		
	21000-30000	0	3		
				0.268	6.310
					0.025, 4.682
					0.182, 13.87
					0.242, 164.57
					0.005, 3.083

treatment indicating some other infection source. One of the explanation about transmission of disease could be through the mother as no one received therapy of infection or went through any surgery of the sort. Statistically, there was no association of transfusion of blood, a foreign travel, any dental treatment, tattoo procedure, any vaccination, jaundice, or any injections with the status of anti – HCV. However, the place of birth of the children, weather the delivery was assisted by a midwife or medical doctor and the source of milk provided to the child were significantly associated (p-values < 0.05 for all). Also, there was no evidence of vertical transmission.

Additionally, as stated earlier out of 208, 8 children were found positive on reactive anti – HCV serum test. As there were no children who shared their utensils with other babies, no OR could be calculated and no p-value could be generated. When the children were categorized according to the type of Genotype, it was found that 1 patients had Type 2 while the sub-type that was found included 2a, and among 3 patients having Type 3, the sub-type was found as 3a, also among the 4 patients, as the viral load was not detectable i.e. < 500

**Table 2:** Summary of association between Hepatitis C and various risk factors among children in public & private hospitals of Lahore

Indicators	Response	Anti HCV Status		P-value	Odds Ratio	Confidence Interval
		Reactive	Non-Reactive			
Have Child Visited Abroad	Yes	0	2	0.287	4.671	0.2077, 105
	No	8	198			
Place of Birth	Public Hospital	5	30	0.007	7.5	1.698,33.113
	Home	3	135			
	Private Clinic	0	35			
Delivery assisted by	Doctor	5	66	0.039	9.69	1.109,
	Midwife	1	128	0.083	0.076	84.718
	LHV	1	1	0.414	0.3788	0.004,
	Relative	1	5			1.4006
						0.036, 3.899
Which kind of milk	Breast Feed	5	46	0.077	1.537	0.075,
	Formula Milk	0	6	0.025	5.362	31.169
	Breast + Formula Milk	3	148			1.234, 23.302
Has child ever been suffered from Jaundice	Yes	0	1	0.146	7.824	0.2964-206.5
	No	8	199			

IU / mL, no identification of genotype was possible. Commonest sub-types found this study was the 3a genotype. The Table No: 3 shows the viral load in the sub-types of anti – HCV and its p-value. As given in the table, there was significant difference in average viral load in the sub-types of genotypes.

**Table 3:** Comparison of Predictive Values (Bishop Score vs. Cervical Length)

Group	Genotype	Number	Mean	Std. Deviation	P-value
Children of age <12 years	2a	1	28735.00	-	0.000
	3a	3	15818.00	2315.763	
	Not Detected	4	450.00	100.000	
	<b>Total</b>	<b>8</b>	<b>9748.63</b>	<b>10873.346</b>	

## Discussion

Literature indicates that Hep-C infection is increasing at an alarming level worldwide as well as in Pakistan. A study reported that in Pakistan, the prevalence of Hep-C was 3.4% (UI= 2.6-4.4).<sup>13</sup> Although this study reported upto 8% prevalence, children need regular screening as they are at higher risk to face Hep-C related complications. One study conducted in Baluchistan, Pakistan, the frequency of Hep-C was found as 2.8% in 6 to 12 years old children and it was found to be 18.3%

among children of 3 to 12 years olds.<sup>14</sup>

This study included a total of 208 patients, and we found the prevalence of 3.85 % among kids who got Hep-C infection which is considerably high in this age group. This study found that none of the children travelled in a foreign country whereas among them, 62.5% were given birth among public sector hospitals and they were given breast milk by mothers. Also, among all, 37.5 % were given birth in their houses and they were given both bottle and breast milk. Among them, none went through blood transfusion and also, none received a tattoo. More-over, none of them had a jaundice and all were vaccinated as well. Studies have reported that the mothers who delivered their babies at home, and those who received Rh factor vaccination had significantly higher risk of getting their babies infected. The frequency is relatively higher upto 55% among patients who had thalassemia and were transfused with blood.<sup>15</sup>

One study conducted in the USA upon the juvenile prisoners found prevalence of 2% Hep (C) while one in UK reported a prevalence of 2.9% in the child population<sup>16</sup> They also found that primary source of infection in them was through their mothers.<sup>17</sup> In our study as well, the major source of spreading the infection was through their mothers. One study done by Jafri et al. reported a prevalence of Hep (C) but major source of contracting

virus in their study was through injections<sup>(18)</sup>. Which is contrary to our study in which none got it through injections.

Moreover, one other study conducted in the USA reported prevalence of 0.4% among children. Among them, adult cases showed a decreasing trend but new cases among children were increasing. The major way of transferring the infection in their study was through their mother. Although the prevalence reported in their study was relatively lower compared to ours, but the source of infection was same as ours and should be considered as high priority in screening if mother gets infected during pregnancy.<sup>19</sup> Other literature also states that factors like hospitalization, surgical procedures, transfusions and injections are major causes of spreading infection.<sup>20,21</sup> However, in our study none of these factors were statistically significant and were not associated with spread of infection as well.

Ahmad et al<sup>22</sup> reported that among others the most significant factors for transmission of Hep-C include blood transfusion, barber shops and dental surgery. Similarly, in our study none of the children share any of the utensils with others. Estonia and Greece have reported decreases in subtype of genotype 1b and 2 and/or increases in subtype of genotype 3a over time.<sup>23,24,25</sup> Many studies conducted in Pakistan found that 3a and 1a genotypes of HCV infection were the most common.<sup>26,27</sup> Similarly, in our study the prevalent subtype of HCV genotype was 3a. Jimenez et al<sup>28</sup> showed that 22.4% of HCV infection cases with genotype 1 were categorized in the low HCV RNA viral load while in our study HCV RNA viral load with 3a genotype was prevalent in children <12 years of age. Saleh et al<sup>15</sup> found that children with HCV RNA positive mothers (0.44%) had a 1.7 times higher risk of getting HCV infection than those with HCV RNA negative mothers (0.26%).

### Conclusion:

This study concludes that the prevalence of HCV is 3.85% in children in Lahore city of Pakistan, which is alarming situation for healthcare providers, researchers and policy makers. Early screening and timely intervention can reduce the burden of Hep-C among children.

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