

Seroprevalence of B and C Viral Hepatitis Among Madaaris Students, An Outlook from Multi-Ethnic Population of Peshawar, Pakistan

Fawad Inayat*, Imad Tariq†, Haris Qurashi‡, Atta Ur Rehman§, Muhammad Jaseem Khan**, Abdul Majid††, Noor Ullah††

Abstract:

Hepatitis B and C are substantial public health problems, causing significant morbidity and mortality. The current cross-sectional study was performed to establish the prevalence of hepatitis B and C infection in the students at Islamic religious schools (Madaaris) in district Peshawar, Pakistan. This analytical cross-sectional study was performed from April 2019 to September 2019 at the Pathology laboratory of Khyber Medical University Institute of Paramedical Sciences Peshawar. Venous blood was collected from 493 subjects from different Madaaris of district Peshawar and screened for the presence of HBsAg and anti-HCV by immunochromatographic (ICT) method. Positive cases were further confirmed by chemiluminescent microparticle immunoassay (CMIA) assay. To the best of my knowledge, this is the first report regarding HBV and HCV infection. Hepatitis B and C viral infections in the students and staff of Madaaris was low with a 0.4% prevalence of C, and 1.41% of hepatitis B. Distribution of HCV infection occurred in various age groups as one case in the age group of 13-18, and one in 19-24 years. No HCV infection was detected in married students, while 2 cases were found positive in unmarried individuals. In the case of HBV infections, five subjects were detected in age groups of 19-24 years while 2 cases in 13-18 years. Of seven cases, one was positive in married, while six were noted in unmarried subjects. One case was positive for HBV infection with positive family history for both HBV and HCV infections. All the vaccinated individuals were found negative for HBV infections. Furthermore, one (0.6%) were co-infected with HBV and HCV infections. The occurrence of hepatitis B and C was comparatively (in school and community) low in the students and staff of

* Institute of Paramedical Science (IPMS), Khyber Medical University (KMU), Peshawar, Pakistan. fawad.313b@gmail.com

† Institute of Paramedical Science (IPMS), Khyber Medical University (KMU), Peshawar, Pakistan. imadmls33@gmail.com

‡ Institute of Paramedical Science (IPMS), Khyber Medical University (KMU), Peshawar, Pakistan. harisqurashi32@gmail.com

§ Fundação Oswaldo Cruz, Fiocruz, Laboratório de Hanseníase. Rio de Janeiro, RJ, Brasil. atta25394@gmail.com

** Institute of Paramedical Science (IPMS), Khyber Medical University (KMU), Peshawar, Pakistan. Jaseem.ipms@kmu.edu.pk

†† ³Wazir Muhammad Institute of Paramedical Technology, Gandhara University Peshawar. majid1991mlt@gmail.com

†† Institute of Paramedical Science (IPMS), Khyber Medical University (KMU), Peshawar, Pakistan. noor1.qau@gmail.com, noor.kmu03@gmail.com

Madaaris from Peshawar. HBV is more prevalent in young males as compared to HCV.

Keywords: Anti-HCV, CMIA, HBsAg, ICT method, Madaaris.

Introduction

Viral hepatitis B and C both are substantial public health challenges. Hepatitis b as well as hepatitis c both are viral infections that cause liver complications, i.e., liver cirrhosis, liver cancer, hepatocellular carcinoma, and liver failure, which eventually lead to death (Mostafa et al., 2016). According to a report appraised critically by WHO in 2017, viral hepatitis has caused 1.37 million deaths in 2015, which is considerably high compared to other infectious diseases such as tuberculosis and human immunodeficiency virus (Easterbrook, Roberts, Sands, Peeling, & AIDS, 2017; Zamperetti, Bellomo, Piccinni, & Ronco, 2011). The deaths in 2015, due to viral hepatitis, predominantly occurred due to chronic liver diseases, of which 720,000 were by liver cirrhosis and 470,000 due to hepatocellular carcinoma (Lavanchy, Kane, Liaw, & Zoulim, 2016). According to an approximation in 2017, globally, 257 million people got chronically infected with hepatitis B virus (HBV) infection and 171 million with hepatitis C virus (HCV) infection (Easterbrook et al., 2017; Lavanchy et al., 2016). The regions most affected by HBV infection were African and the Western Pacific. At the same time, HCV infected all regions as the WHO Eastern Mediterranean region (with the frequency of 2.3%) and the European region (with the frequency of 1.5%) are highly epidemic (Choo et al., 1989; Groeger, Flaxman, & Wiersma, 2013; Lavanchy et al., 2016; Planas et al., 2006; C. Shepard, Finelli, & Alter, 2005; Xue, Elbendary, & Wu, 2019). Initially, hepatitis B infection is asymptomatic, spreading in public via unsafe sexual activities, unsafe medical procedures, contaminated surgical tools, tattooing, and piercing ears and nose for jewellery purposes (C. W. Shepard, Simard, Finelli, Fiore, & Bell, 2006). In high endemic areas globally, the infection spreads prenatally from chronic carriers and via unprotected sexual activities.

In contrast, in areas with low endemicity, the infection spreads due to lifestyle habits and unsafe occupational activities (Easterbrook et al., 2017; Jafri et al., 2006; Lavanchy et al., 2016; Maistre Melillo & Chircop Micallef, 2007). Worldwide 250 to 350 million individuals caught HBV infection, of which 15-20% lead to chronic liver diseases and 15-25% cases lead to death (Lee, 1997; Liaw & Chu, 2009; Volinsky, 2021). Pakistan is a high intermediate to high endemic for hepatitis B and C infections with a percentile distribution of 1.50-8.4% for HBV and 2.56-

13.6% for HCV (Alam et al., 2007; M. Ali et al., 2011; Nygaard et al., 2003). Quite A Few factors involving transfusion of inappropriately screened blood or blood products, nose or ear pricks by unsterilized needles, reuse of syringes for injections in the general public by quacks, and frequently visiting barbers for shaving purposes are responsible for this (Jafri et al., 2006; Lee, 1997; Maistre Melillo & Chircop Micallef, 2007; Nygaard et al., 2003; Xue et al., 2019). Lateral transmission in children is more common than vertical transmission and is more accountable for chronic hepatitis B in this region (Alam et al., 2007). Unsafe sexual practices account for fewer cases than those in developed countries (Al Kanaani, Mahmud, Kouyoumjian, & Abu-Raddad, 2018).

Pakistan is a diverse country regarding religion, culture, ethnicity, geographic and temporal distribution. Administratively Pakistan is divided into four distinct provinces, federally-administered tribal areas which now have been merged in Khyber Pakhtunkhwa and Jammu and Kashmir (Ahmad & Bigirimana, 2021; Maistre Melillo & Chircop Micallef, 2007). The epidemiologic distribution of hepatitis B and C among different provinces of Pakistan varies. Baluchistan highly endemic with a prevalence of 4.3% for HBV and 2.5% for HCV, Sindh with a prevalence of 2.5% for HBV and 6% for HCV, Punjab with a prevalence 2.4% for HBV and 5.4% for HCV and Khyber-Pakhtunkhwa with a prevalence of 1.4% for HBV and 6.07% for HCV (Amjad Ali et al., 2010; Arshad & Ashfaq, 2017; Attaullah, Khan, & Ali, 2011; Control & Prevention, 2011; Hassan-Kadle, Osman, & Ogurtsov, 2018; Umar et al., 2010). However, high-risk groups with higher prevalence have been reported in family members of hepatitis B and C patients (S. Akhtar & Moatter, 2004). *Madaaris* are where students from different regions and ethnicities are enrolled for education. Data about the current burden of Hepatitis B and C infection among the students and staff of *Madaaris* in KP and overall Pakistan is lacking till June 2020. Therefore, the current study aims to determine the seroprevalence of Hepatitis B and C viral infection in this unexplored section of the Pakistani population.

Methods/Participants

This cross-sectional analytical survey was performed in Peshawar from April 2019 to September 2020. The study was carried out after being approved by the ethical committee of Khyber Medical University. Venous blood samples were taken from 493 students and staff of different *Madaaris* following written informed consent. Individuals with Hepatitis B or C infection were excluded from the study. Samples were tested for Hepatitis B surface antigen (HBsAg) and Anti HCV antibodies by

immunochromatographic method (ICT) using an ICT device by Abon Biopharm, Hangzhou) Co., Ltd. Positive results were confirmed by chemiluminescent microparticle immunoassay (CMIA), a 4th generation ELISA by Roche diagnostics Switzerland. SPSS (v.25) was applied for the statistical analysis. Descriptive statistics (mean, frequencies and percentages) were used to analyze the obtained data.

Inclusion and Exclusion Criteria

All the current enrolled male students were included in this study because of easy accessibility. At the same time, those who are already positive for HBV and HCV infection and those who refuse to participate are excluded from this study.

Results

The study subjects were all males having a mean age of 18.5 ± 4.5 years. They were dispersed among different *Madaaris* of district Peshawar including Jamia Dar-Ul-Furqan 116 (23.53%), Jamia Uloom-Ul-Quran 106 (1.50%), Jamia Madina-tul-Uloom 80 (16.23%), Jamia Dar-ul-Uloom 55 (11.16%), Jamia Dar-ul-Uloom Taleem-ul-Quran 48 (9.74%), Jamia Taleem-ul-Quran 40 (8.11%), Jamia Ahsan-ul-Madaris 20 (4.06%), Jamia Imdad-Ul-Uloom 15 (3.04%), Jamia Mariful-ul-Quran 13 (2.64%) (Figure 1).

Out of 493 subjects, 9 (1.82%) were reactive for either hepatitis B or C. Among the reactive cases, 07 (1.41%) were positive for hepatitis B, and 02 (0.4%) were positive for hepatitis C (Figure 2). Hepatitis B infection was more common in the age group of 19-24 years. Out of the total 493 subjects, 15 (3.04%) were vaccinated against HBV infection, while 478 (96.96%) were non-vaccinated. All the vaccinated subjects were negative for HBsAg. Out of the total participants, 22 (4.5%) (with a family history) were found positive for HBsAg, 5 (1.0%) for anti-HCV, and 3 (0.6%) were co-infected with HBV and HCV (Figure 3).

Discussion

According to the best of our knowledge, this study investigates the first report of seroprevalence of Hepatitis B (7 cases) and C (2 cases) infection among *Madaaris* students of Peshawar, Pakistan. In the current study, 493 *Madaaris* students were included, distributed among nine different *Madaaris* in district Peshawar, Khyber Pakhtunkhwa. In this study, 1.41% of hepatitis B students were infected; findings of this study closely related to previous reports with a prevalence rate of 3-5% (Lee, 1997; Liaw & Chu, 2009; Volinsky, 2021).

Table 1
Distribution of Hepatitis Band C in Madaaris Students

Parameters	Details of parameter		HBsAg				Anti-HCH			
	Detail	Distribution	Yes		No		Yes		No	
Age group wise distribution	6-12 years	56 11.35%	0	0	56	11.35%	0	0	56	11.35%
	13-18 years	178 36.10%	2	0.40%	176	35.70%	1	0.20%	177	35.90%
	19-24 years	210 42.6%	5	1.01%	205	41.6%	1	0.20%	209	42.4%
	25-30 years	49 9.93%	0	0	49	9.93%	0	0	49	9.93%
Marital Status	Yes	68 13.8%	1	0.20%	67	13.6%	0	0	68	13.8%
	No	425 86.20%	6	1.21%	419	85%	2	0.40%	423	85.8%
Family history of infection	HBsAg	18 3.7%	0	0	18	3.7%	0	0	18	3.7%
	Anti-HCV	3 0.60%	0	0	3	0.60%	0	0	3	0.60%
	Both	9 1.82%	1	0.20%	8	1.62%	0	0	9	1.82%
	Non	463 94%	6	1.21%	457	92.7%	2	0.40%	461	93.5%
Vaccination	yes	15 3.04%	0	0	15	3.04%	-	-	-	-
	no	478 97%	07	1.41%	471	95.53%	-	-	-	-

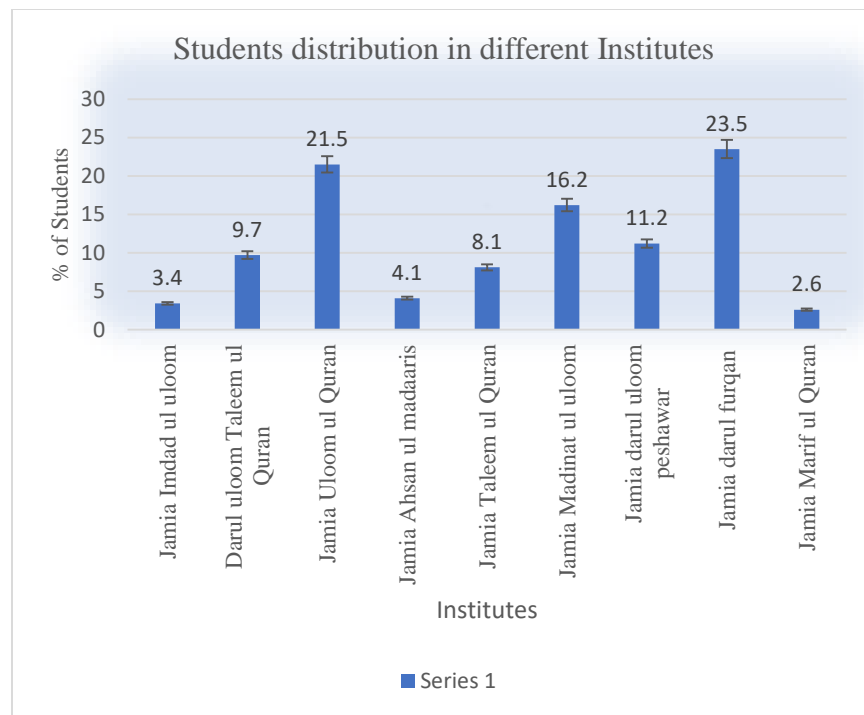


Figure 1: Madaaris wise distribution of the participants

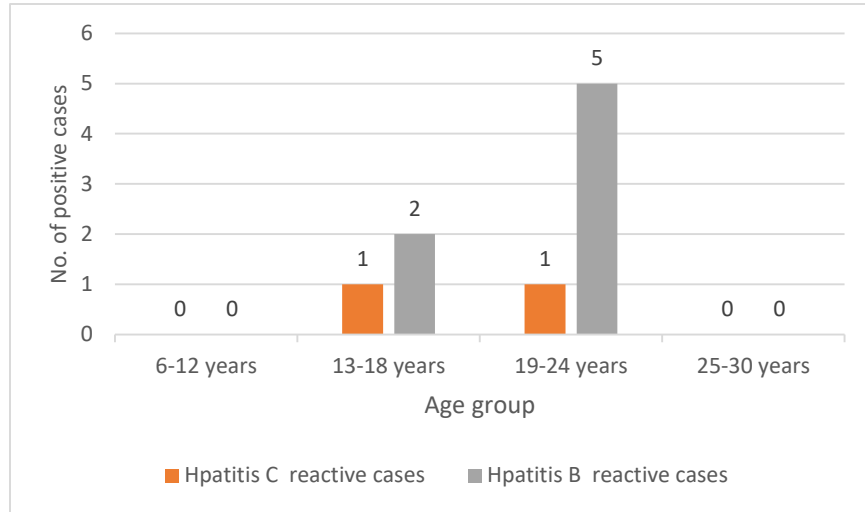


Figure 2: Prevalence of hepatitis B and C among different age groups

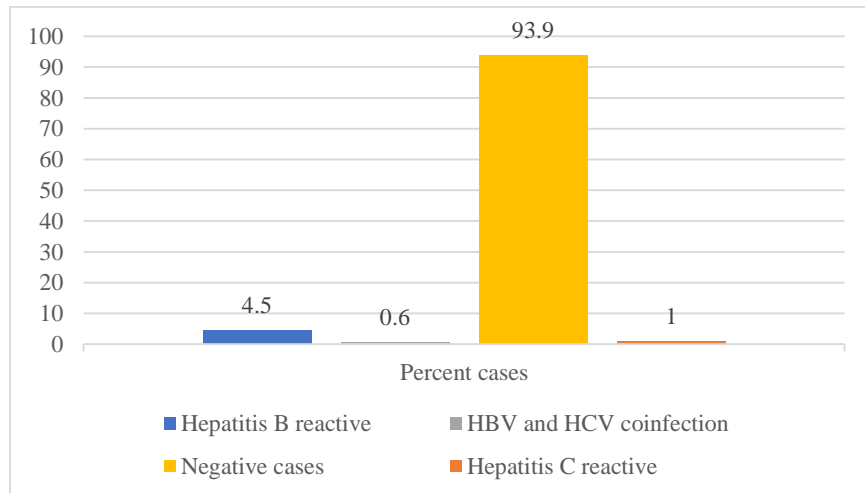


Figure 3: Family history wise distribution of HBV and HCV

According to a rare and fewer cross-sectional national survey, Pakistan falls in a range of high intermediate to high endemic zone regarding the prevalence of HBV and HCV infection (Ahmad & Bigirimana, 2021). Concerning this analytical cross-sectional survey, there is no previous literature evidence of the distribution of HBV or HCV infection in *Madaaris* students in Pakistan.

The awareness level of these students regarding the infection is very low, which ends the way of prevention (Asad Ali, Khan, Malik, Iqbal, & Aadil, 2017; Jamil, Ali, Shaheen, & Basit, 2010). Overall, the gender-wise distribution of this viral infection is more frequent in males than females and was supported by previous literature (A. M. Akhtar, Majeed, Jamil, Rehman, & Majeed, 2016; I. Ali et al., 2011; Safi et al., 2012; Shafiq et al., 2015). Almost all the *Madaaris* students were circumcised by locals, that's is a great risk for the prevalence of viral hepatitis, as reported by (Chanda & Infection, 2020; Safi et al., 2012). Normally all the *Madaaris* students belong to a family of low socioeconomic status, which influences the spread of the infection as previously postulated (A. M. Akhtar et al., 2016; IJAZ & Bhatti, 2013). Four age groups were selected for the present study with a minimum of 6 and a maximum of 30 years. In the current study, five cases were positive for HBV infection in the age group 19-24 years, followed by 13-18 years with two positive cases. Our study closely relates to findings of other studies with HBV infection more prevalent in the age group of 19-24 years (Butt & Sharif, 2016).

A similar epidemiologic pattern was found in western and northern Europe, central Asia regions and the Caribbean (Ahmad & Bigirimana, 2021). In the current study, two cases were positive for hepatitis C infection, one in the age group of 13-18 years and the other in the age group of 19-24 years, with evidence of previous literature review (Amjad Ali et al., 2012; Butt & Sharif, 2016). The highest prevalence of HCV is found in males of two groups, 24-29 and 35-40years (Shafiq et al., 2015). This indicates that the incidence rate has been high in the last 20 to 40 years and predominates in early adulthood, similar to reports observed previously from Australia (Volinsky, 2021). In contrast to this study, a high prevalence rate was observed in Lahore and Gujranwala in the 26-35 years age group (IJAZ & Bhatti, 2013). Furthermore, out of 493 students, only one was diagnosed as co-infected with HBV and HCV infection.

The same kind of prevalence pattern is evidenced by previous reports as 0.11% of co-infection exists in the age group 7-12 years (Butt & Sharif, 2016). Living in combined families sometimes results in close interactions, which may prove pathogenic (Bibi, Dars, Ashfaq, Ara Qazi, & Akhund, 2013). HCV spread is postulated due to household interaction (Bibi et al., 2013; Safi et al., 2012)s, with the highest prevalence being described in internally displaced persons (IDPs) of Malakand Division (Khan et al., 2011). The distribution of the HBV and HCV infection among married students is 0% which is less compared to previously postulated data (Butt & Sharif, 2016). Although it is published previously that intrafamilial HBV infection transmission is more common outside

Pakistan (Butt & Sharif, 2016). Among all the participants, 15 were vaccinated against HBV, which accounts for about 3.04% of the whole population, and all the vaccinated individuals were negative for the infection. In contrast, 7 of the non-vaccinated participants were positive for the infection, which shows a great association between vaccination and prevention of the infection.

The present investigation describes that HBV infection was 0% in the age group of 6-12, while another previous report from Pakistan noticed in 5% of students with age of 7-12 years (Ullah, Ullah, Khan, & Biology, 2020) which is not similar to our study. With the demographic aspect of the current study, the frequency of HBV as well as HCV infection is high in an urban area which contradicts the recently published report (M. I. Shah, Awan, & Biology, 2020). Two percent HCV infection was reported previously from Pakistan; the present study contradicts this study (Butt & Sharif, 2016; Ullah et al., 2020). HCV infection in this study was more predominant (2 cases, 0.40%) in an urban area as compared to a rural area; our findings were not supported by the previous data from Pakistan (Butt & Sharif, 2016; H. B. U. Shah et al., 2015). Also, the HBV infection is more prevalent in an urban area in the current study, which is not supported by previously published data from Muzaffar Garh Pakistan (Khan et al., 2011; M. I. Shah et al., 2020; Ullah et al., 2020).

The participants who willingly took part in this study were distributed into four age groups with a minimum age group starting from six years and a maximum of 30 years of age. The occurrence of the HBV and HCV infection within each *Madrassa* does not depend on location because all the samples were collected from Peshawar; rather, the distribution may depend upon the risk factors associated with each *Madaris*. The frequency of the HBV and HCV infection is high in family members of the infected person, which was estimated 2.5 times that found in the general population (S. Akhtar & Moatter, 2004). In the current study prevalence of HBV infection in families having a previous history of HBV is zero out of 3.6% of the whole population. Similarly, the prevalence of HCV infection in families having previous history of HCV is zero out of 0.6% of the whole population. This indicates that there is no such impact of family history on the transmission of the infection in this study.

It is clear from our results that the prevalence of hepatitis B infection is 0.40% and that of hepatitis C is 1.41% in the studied population. This is not alarming based on frequency as the prevalence is counted in low endemic parts. Still, being a contagious infection, it may spread among the students of the *Madaaris* as they live a much more social life like a family (Bibi et al., 2013; Safi et al., 2012; Shafiq et al., 2015). It

is further concluded that HBV infection is more prevalent among the students of *Madaaris* as compared to HCV infection. The results of this survey will provide valuable help to the health care system of Pakistan in designing protective actions and their hands-on execution according to local circumstances. Moreover, additional large-scale surveys are necessary to establish the actual disease load in the Islamic Religious School (*Madaaris*) of Pakistan.

Conclusion

The HBV and HCV infection are at the low endemic level in *Madaaris* students, which is low compared to other school students and community members. But being a contagious infection, it is alarming because the *Madaaris* students usually live together in hostels. The frequency of HBV infection is high (7 cases) compared to HCV infection, which means that spread of HBV infection is more common in this study. Furthermore, being a vital part of the society, this population is at risk. Therefore, it is of immense need to educate this specific part of the society by arranging seminars. Moreover, to get rid of the spread of the infection, it is necessary at national as well as at international level to distinguish health policies and implement accordingly to ascertain the actual disease burden.

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