Hepatitis B and C prevalence and its associated risk factors among school going children in urban and rural areas of District Muzaffar Garh, Pakistan

Sikandar Hayat[1,2], Muhammad Naeem[1*], Arif Malik[2], Qurban Ali[2], Muhammad Khalid[1], Samrah Masud[1] and Arif Mahmood Bhutta[1]

[1]Institute of Pure and Applied Biology, Bahauddin Zakariya University, Multan, Pakistan
[2]Institute of Molecular Biology and Biotechnology, University of Lahore, Lahore Pakistan

Corresponding author: Muhammad Naeem
E-mail: dr_naeembzu@yahoo.com
Genet. Mol. Res. 19 (1): gmr16039975
Received: November 30, 2019
Accepted: February 4, 2020
Published: February 11, 2020

ABSTRACT. Viral Hepatitis like hepatitis B and hepatitis C are the serious cause of mortality in Pakistan. Present study estimated the prevalence and risk factors associated with Hepatitis B and C among school going children from urban and rural areas. In urban areas overall prevalence of HBV was 5% where the highest prevalence of HBV was 80% and 20% in males and females respectively while HCV overall prevalence in that area was 2% where highest prevalence of HCV was 0% in male and 100% in female. In rural areas overall prevalence of HBV was 10% where the highest prevalence of HBV was 80% in males as compared to female with prevalence of 20%, overall prevalence of HCV in that area was 8% and it was 80% in males and 75% in females. Prevalence of HBV was 60%, 20% and 20% while the HCV was 0%, 0% and 100% in age groups of 5-10, 11-15 and 16-20 years respectively in urban areas. In same age group this prevalence of HBV was 30%, 20% and 50% while HCV was 25%, 25% and 50% respectively in rural areas. Epidemiological risk factors for HBV and HCV in urban and rural areas were economic status, injection user, ear/nose piercing, hospitalization, surgery, blood transfusion and family history. Among these factors in urban areas highest HBV was 40% in poor and middle economic status, 0% in surgery, while highest HCV was 100 in poor and 0% in surgery. In rural area highest HBV was 80% in poor and 0% in surgery while highest HCV was 62.5% in poor and 0% in surgery.

Keywords: Hepatitis B; Hepatitis C; Children; Urban area; Rural area; Economic status

INTRODUCTION

Hepatitis is a serious health concern with a high rate of mortality and morbidity world over (Abdullah, 2018). Hepatitis B and C are the major health problem for Pakistan. Both Hepatitis B virus and hepatitis C virus are the principal causes of severe liver disease, including hepatocellular carcinoma and cirrhosis-related end-stage liver disease. In Pakistan, people are facing numerous health challenges due to rapid invasion of hepatitis B and hepatitis C. Pakistan carries one of the world's highest burdens of chronic hepatitis and mortality due to liver failure and hepatocellular carcinomas. It has been estimated that between 2% to 6% of all the patients with HCV cirrhosis will develop hepatocellular carcinoma over 10 years. Both HCV and HBV infections are leading causes of HCC in Pakistan. Pakistan is the intermediate zone for both hepatitis B and C with prevalence of 3-4% for hepatitis B and 4-6% for hepatitis C (Abbas et al., 2004; Hamid et al., 2004; Abbas et al., 2006). However, in some areas of the country the prevalence of hepatitis B and C is still very high. Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are important public health problems with broad clinical spectrums, from asymptomatic infection to cirrhosis and hepatocellular carcinoma (Tan, 2011; WHO, 2014). According to the World Health Organisation (WHO), approximately 240 million people are chronically infected with HBV worldwide, while 150 million people are infected with HCV (WHO, 2014). Hepatitis B virus and hepatitis C virus are the principal causes of severe liver disease, including hepatocellular carcinoma and cirrhosis-related end-stage liver disease.

The prevalence of HBV infection and the predominant mode of transmission vary greatly depending on the geographical region and epidemiologic factors (Kane, 1996). Infections acquired in childhood are responsible for the majority of chronic HBV cases, with its related complications including cirrhosis and hepatocellular carcinoma (HCC). Prevention of childhood HBV infection has a large impact on the prevalence of chronic HBV infection and its sequelae (Beasley et al., 1981). Immunization remains the most effective way to control HBV infection (Chang et al., 2003; Yu et al., 2004). A large number of HBV and HCV studies have been carried out in Pakistan over the past two decades, restricted to clinical and hospital-based settings, blood bank institutions and small communities that could not validly demonstrate the distribution of HBV and HCV in the general population, though corroborating the existence of a high burden of chronic liver disease (CLD) in the country (Khan et al., 2007; Ali et al., 2009).

Pakistan is divided into four provinces, Punjab, Sindh, Khyber Pakhton Khaw (KPK) and Balochistan as well as federally administered areas including the capital (Islamabad), Federally Administered Tribal Areas (FATAs) and the western third of Jammu and Kashmir (Country profile, 2005; Constitutional basis, 2007). Considering Pakistan's size and large, growing population, there is a surprising dearth of information about hepatitis prevalence, although more is known about its risk factors. Hepatitis B and C share common transmission pathways; thus, it is possible to investigate them simultaneously. The prevalence of HBV and HCV markers in children varies by risk factors and geographic location (Qamer et al., 2004; Porto, 2012). Moreover, it is well known that children are exposed to increased risk factors, such as tattooing, body piercing, which can lead to HBV and HCV infection (Meheus, 2000). Thus, a serological survey was performed among children living in urban and rural areas of District Muzaffar Garh to evaluate the changes in HBV and HCV profiles. The present study estimated the prevalence and identified risk factors associated with Hepatitis B surface antigen (HBsAg) and HCV antibody (anti-HCV) seropositive among children 5 to 20 years age students. Hepatitis B and C are the major health problems for Pakistan. Transmission can occur vertically or horizontally. In the developing countries it is mainly transmitted during childhood. No local studies have assessed the prevalence of hepatitis B and C among the children. The aim of this study was to determine the prevalence and identify risk factors associated with the spread of hepatitis B and C in school going children.

MATERIALS AND METHODS

A total of 200 blood samples were collected from school going children of different age groups from urban and rural areas of District Muzaffar Garh. A prospective cross-sectional study was conducted to achieve the primary objective to estimate the prevalence of anti HBsAg and anti-HCV sero-positivity and evaluate potential risk factors by comparing seropositive and seronegative for HBsAg and anti-HCV antibody among children. Blood samples were tested for hepatitis B surface antigen (HBsAg) and anti-hepatitis C antibodies (anti- HCV) by using different techniques i.e., screening (immune chromatographic) method and confirmed by Enzyme Linked Immunosorbent Assay (ELISA) method. The HCV reactive specimens were further analyzed by polymerase chain reaction (PCR) either positive or Negative.

RESULTS

In the developing countries HBV and HCV is mainly transmitted during childhood due to different risks factors. The sampling frame of the present study comprised 200 subjects belonging to different urban and rural areas of District Muzaffar Garh. Out of 200 hundred samples 100 children belonged to urban area and 100 belong to rural area.

In urban areas it has been observed that overall prevalence of HBV infection was 5/100 (5%) where the highest prevalence of HBV was (80%) in males as compared to female with prevalence of (20%) while the HCV prevalence in that area was 2/100 (2%) where highest prevalence of HCV was (0%) male and (100%) female. In the same way it was investigated that in rural areas the overall prevalence of HBV infection was 10/100 (10%) where the highest prevalence of HBV was (80%) in males as compared to female with prevalence of (20%), while the overall prevalence of HCV in that area was 8/100 (8%) and prevalence of HCV was (80%) in males and (75%) in females. During this study it was also observed that highest prevalence of HBV among both male and female was in age group of (5-10) years (60%) while prevalence of HCV among both male and female was highest in age group of (16-20) years (100%) in urban areas. The prevalence of HBV and HCV was highest (50%) both in male and female in age group of (16-20) years in rural areas. It has been investigated that in urban areas males are more prevalent to HBV while females are more prevalent with HCV, while in the case of rural areas prevalence of HBV and HCV is high in males as compared to females.

The identified associated epidemiological risk factors in prevalence of hepatitis B and C in urban areas were economic status (poor 40% and 100%, middle 40% and 0%, rich 20% and 0%), injection user 60% and 100%, ear/nose piercing 20% and 50%, hospitalization 20% and 0%, surgery/dental surgery 0% and 0%, blood transfusion 20% and 50%, family history of HBV infection 60% and family history of HCV infection 0% respectively. In the same way the identified associated epidemiological risk factors in prevalence of hepatitis B and C in rural areas were economic status (poor 80% and 62.5%, middle 10% and 25%, rich 10% and 12.5%), injection user 20% and 37.5%, ear/nose piercing 20% and 0%, hospitalization 10% and 0%, surgery/dental surgery 0% and 0%, blood transfusion 10% and 12.5%, family history of HBV infection 40% and family history of HCV infection 25% respectively (Tables 1-6 and Figures 1-10).

Table 1. Overall prevalence of HBV and HCV in urban area.

No. of Sample	HBV % age	HCV % age
100	5	2

Table 2. Overall prevalence of HBV and HCV in rural area.

No. of Sample	HBV % age	HCV % age
100	10	8

Table 3. Age and sex wise prevalence of HBV and HCV in urban area.

Age group (Years)	HBV % age		HCV % age	
	N (5)	% age of infection	N (2)	% age of infection
05-10	3	60	0	0
11-15	1	20	0	0
16-20	1	20	2	100
Sex				
Male	4	80	0	0
Female	1	20	2	100

Table 4. Age and sex wise prevalence of HBV and HCV in rural area.

Age group (Years)	HBV % age		HCV % age	
	N (10)	%age of infection	N (8)	%age of infection
05-10	3	30	2	25
11-15	2	20	2	25
16-20	5	50	4	50
Sex				
Male	8	80	6	75
Female	2	20	2	25

Table 5. Epidemiological parameters considered in HBV & HCV positive subjects in urban area.

S. No	Parameters	HBV Positive		HCV Positive	
	Total Subject	N-5	%age	N-2	%age
1	**Economic Status**				
	Poor	2	40	2	100
	Middle	2	40	0	0
	Rich	1	20	0	0
2	Injection	3	60	2	100
3	Ear/Nose Piercing	1	20	1	50
4	Hospitalization	1	20	0	0
5	Surgery/Dental surgery	0	0	0	0
6	Blood Transfusion	1	20	1	50
7	Family history of HBVandHCV infection	3	60	0	0

Table 6. Epidemiological parameters considered in HBV & HCV positive subjects in rural area.

S. No	Parameters	HBV Positive		HCV Positive	
	Total Subject	**N-10**	**%age**	**N-8**	**%age**
1	**Economic Status**				
	Poor	8	80	5	62.5
	Middle	1	10	2	25
	Rich	1	10	1	12.5
2	Injection	2	20	3	37.5
3	Ear/Nose Piercing	2	20	0	0
4	Hospitalization	1	10	0	0
5	Surgery/Dental surgery	0	0	0	0
6	Blood Transfusion	1	10	1	12.5
7	Family history of HBV and HCV infection	4	40	2	25

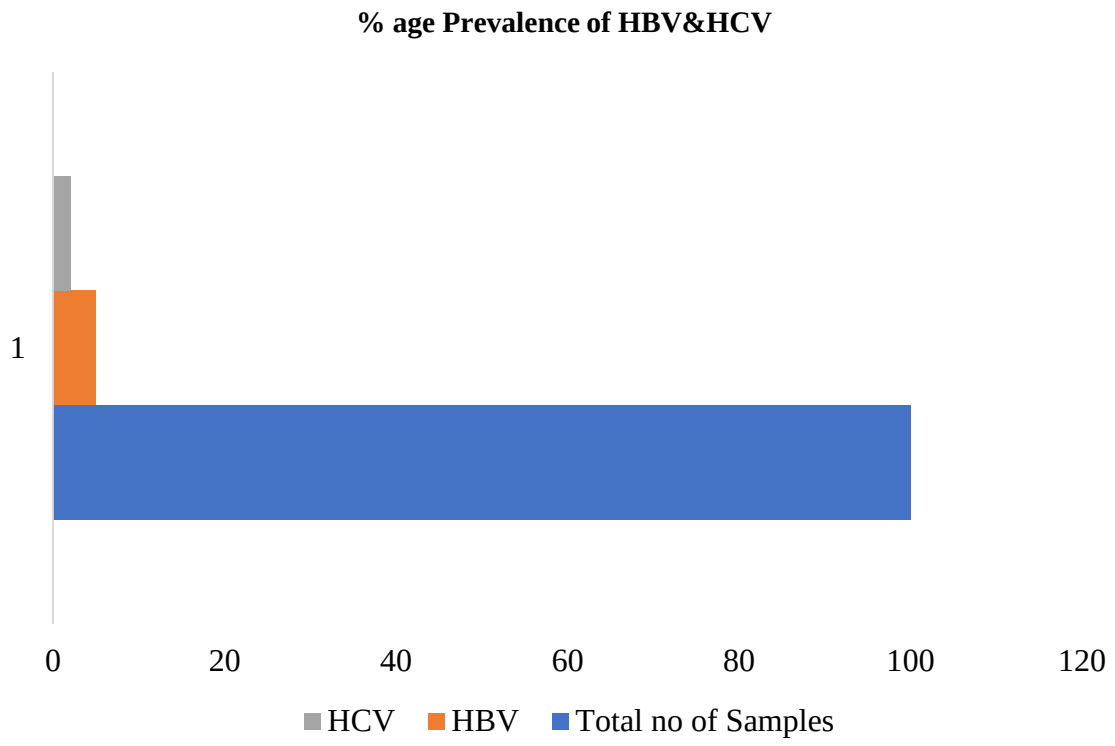

Figure 1. Overall prevalence of HBV and HCV in urban area.

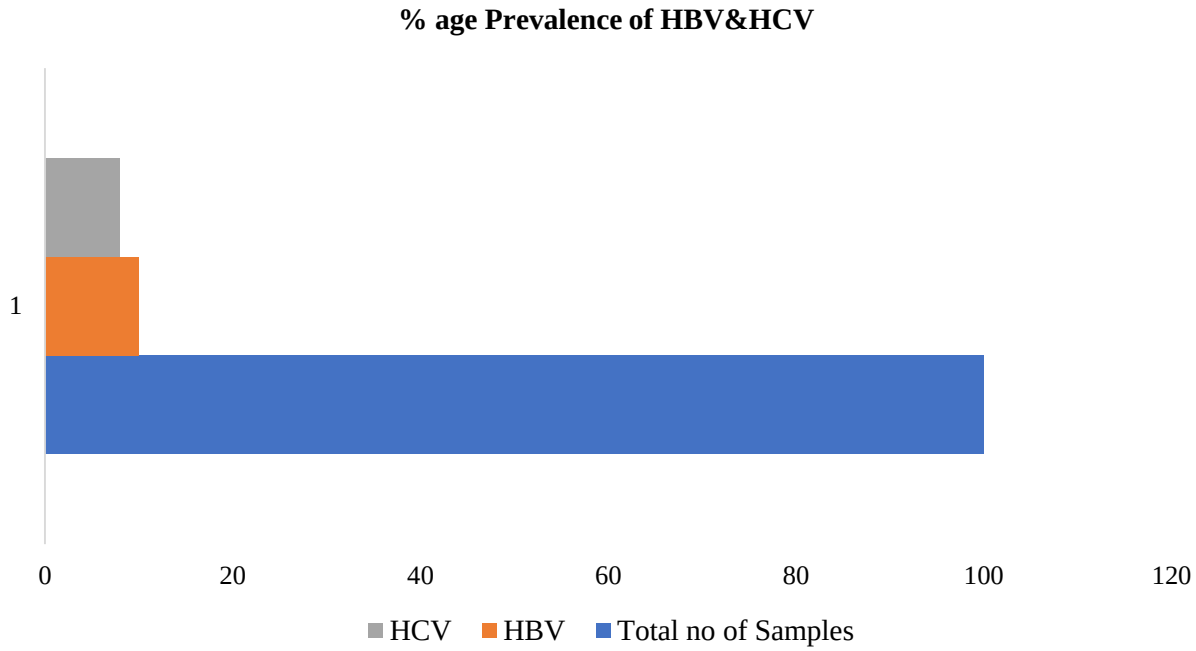

Figure 2. Overall prevalence of HBV and HCV in rural area.

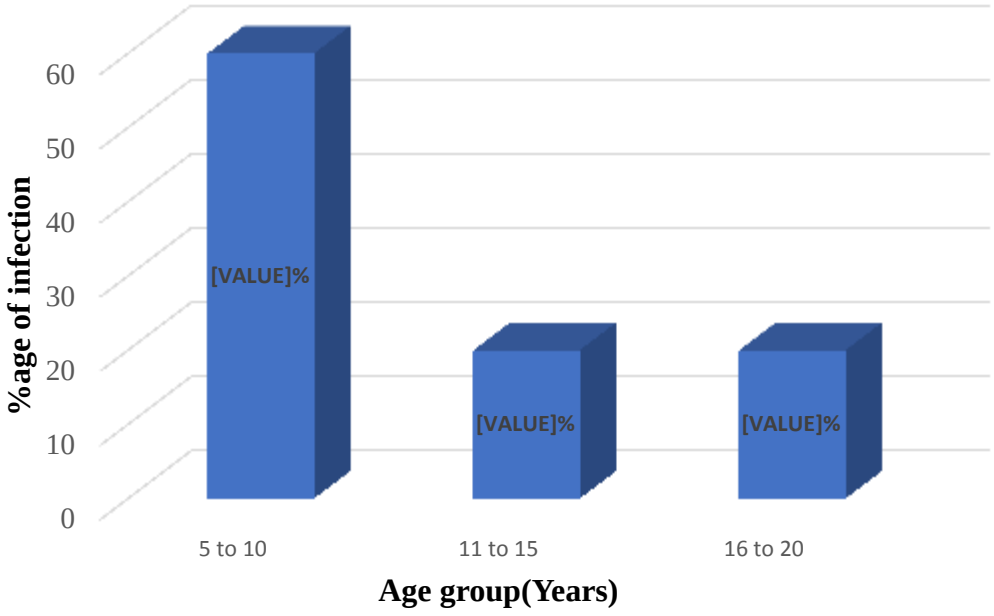

Figure 3. Age wise prevalence of HBV in urban area.

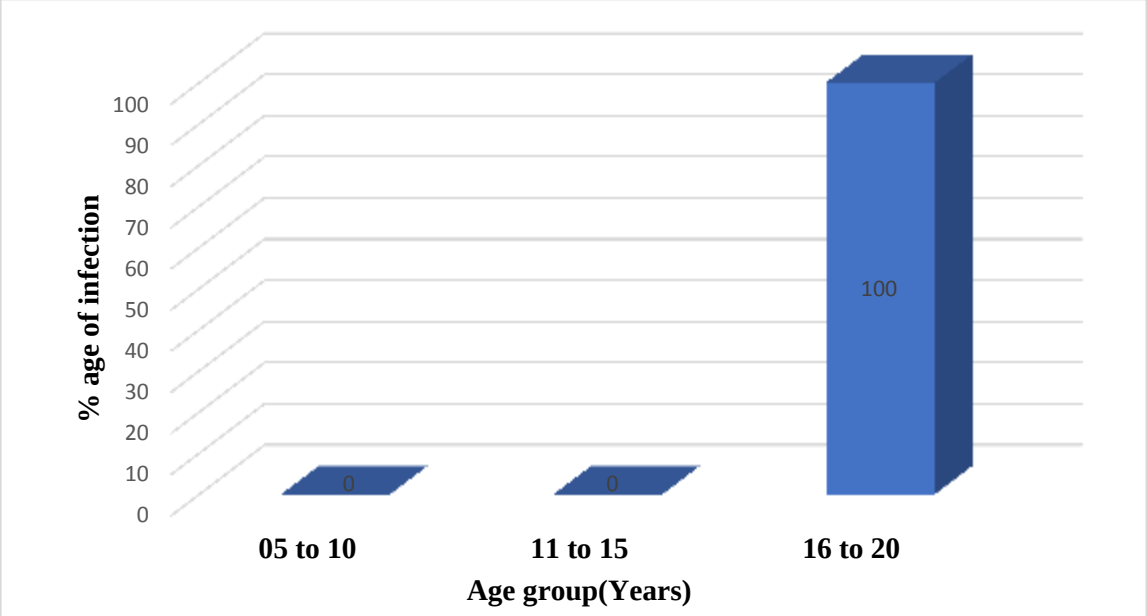

Figure 4. Age wise prevalence of HCV in urban area.

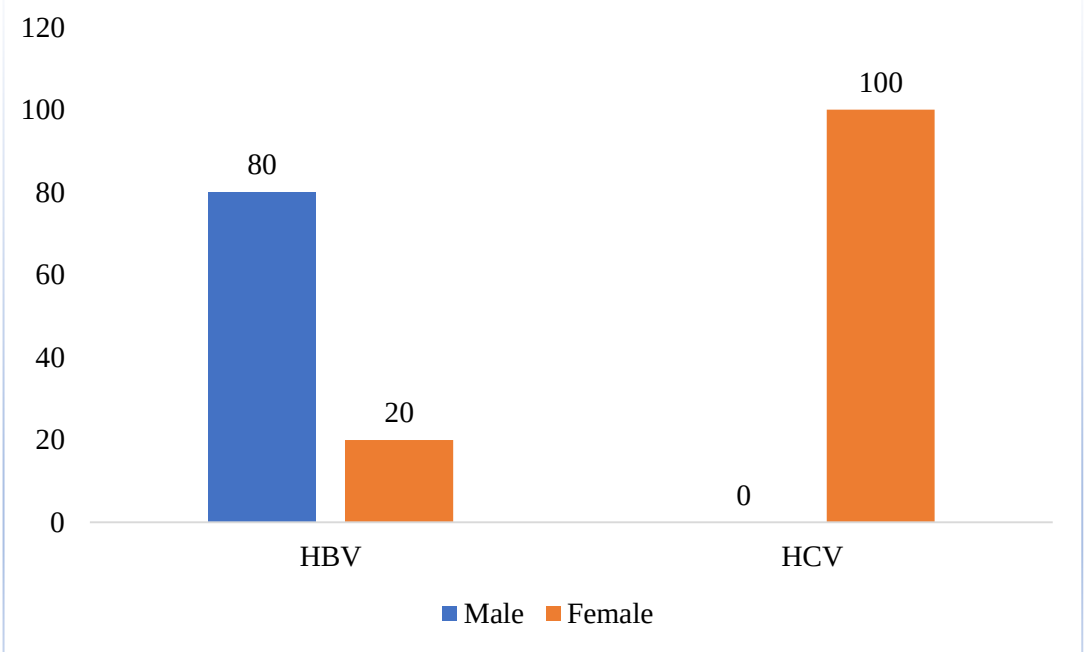

Figure 5. Sex wise prevalence of HBV and HCV in urban area.

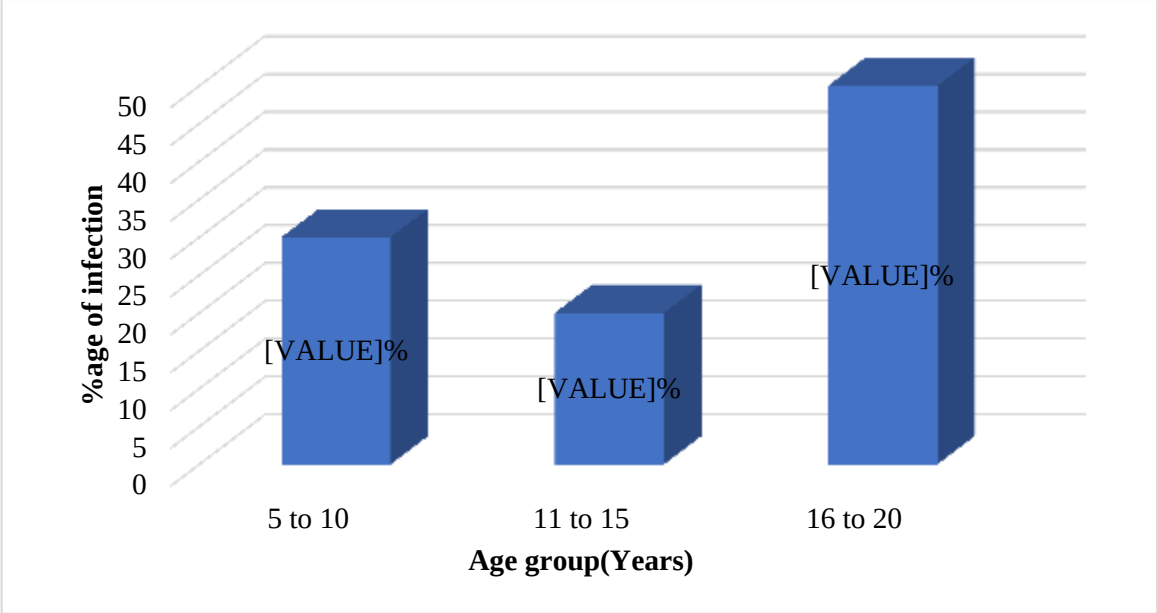

Figure 6. Age wise prevalence of HBV in rural area.

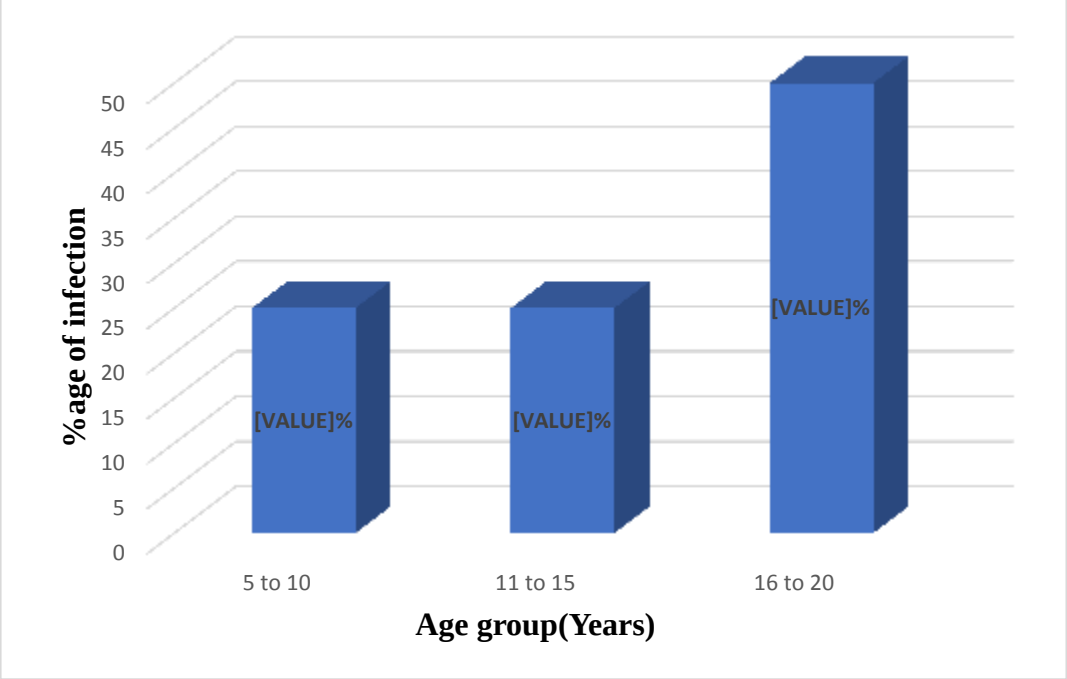

Figure 7. Age wise prevalence of HCV in rural area.

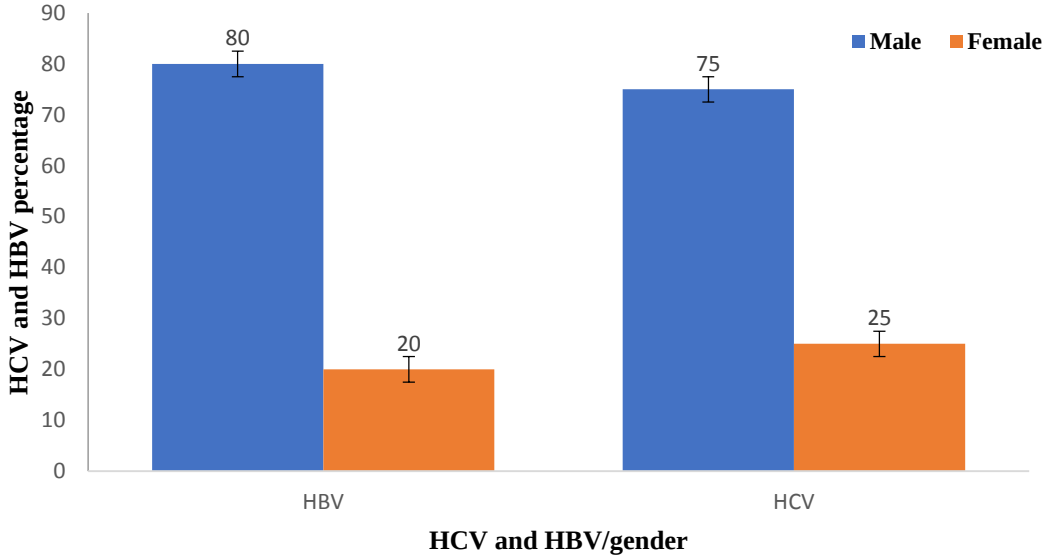

Figure 8. Sex wise prevalence of HBV and HCV in rural area.

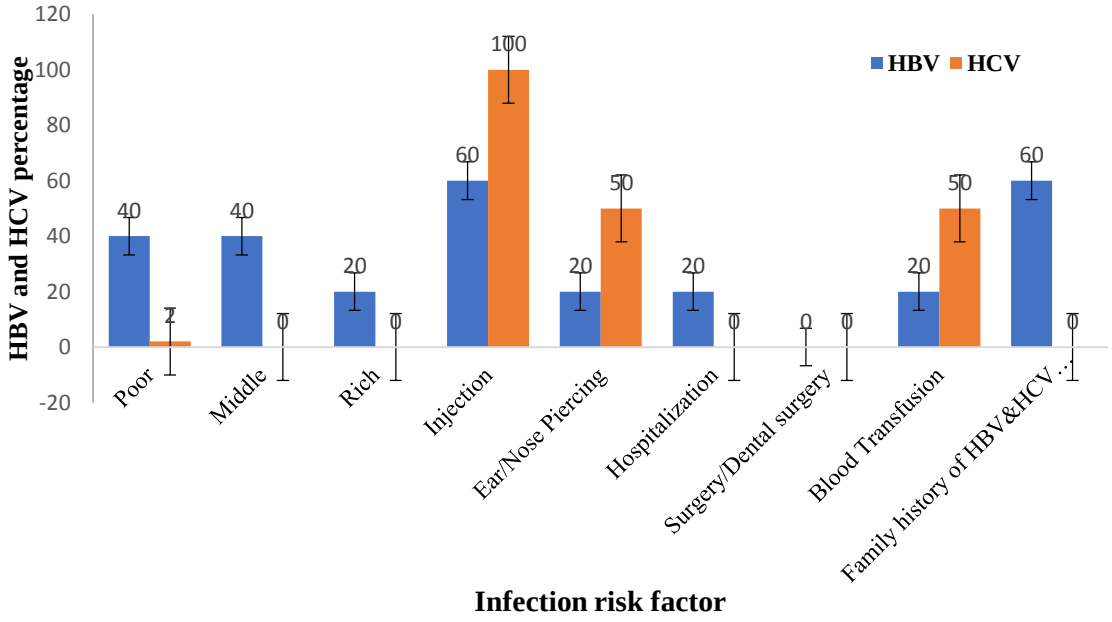

Figure 9. Epidemiological parameters considered in HBV and HCV positive subjects in urban area.

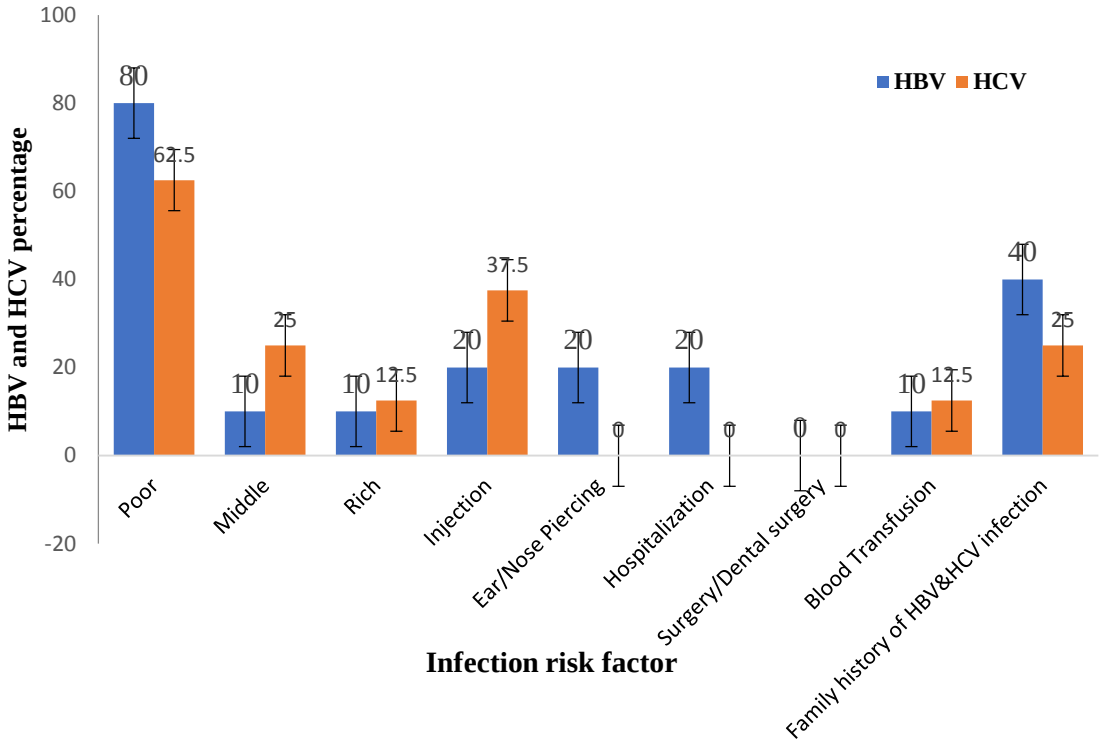

Figure 10. Epidemiological parameters of HBV and HCV positive subjects in rural area discussion.

DISCUSSION

Pakistan lies between middle to low income countries with over one-twelfth of labor force is unemployed, over one third of the population lives in poverty and over half the population is illiterate, with parts of the country being worse than what the national average indicates (Qureshi and Bengali 2003). Special attention has been given to children under the age of 5 years to 20 years. These children have received primary schooling, but their parents were mostly uneducated. The educational status of parents of HBsAg positive children and HCV positive was significantly low. Both children and their parents have a poor knowledge of HBV and HCV related diseases. The study of prevalence of HBV and HCV and probable routes for transmission among the school going children of urban and rural areas of District Muzaffar Garh was very critical task. This information is critical to a better understanding of the burden of the disease and developing appropriate preventive programs to control the spread of HBV and HCV infection in urban and rural areas school going children. The confirmed HBV and HCV seroprevalence among urban and rural areas school children in this study was 5%, 2% and 10%, 8% respectively (Tables 1 and 2 and Figures 1 and 2).

Some studies of anti-HCV have documented a seropositive rate of 3.3% among 251 children aged 4-11 years in the country (Baatarkhuu et al., 2004). However, another study revealed a high prevalence (15.8%) of HCV infection among the 127 children of comparable age (8-11 years) residing in the capital Ulaanbaatar city (Dagwadorj et al., 1999). It is assumed that HCV infection is less common in urban areas school going children as compared to rural areas. The prevalence of anti-HCV in this study was similar to that reported for children of comparable age (0.8% by ELISA and RIBA) in Italy where chronic HCV infection is highly endemic among the adult population. The increasing trend of anti-HCV seropositivity by age in the present study was in concordance to

that previously found in Mongolia (Baatarkhuu et al., 2004; Takahashi et al., 2004). The identified associated epidemiological risk factors in prevalence of hepatitis B and C in urban areas were economic status (poor 40% and 100%, middle 40% and 0%, rich 20% and 0%), injection user 60% and 100%, ear/nose piercing 20% and 50%, hospitalization 20% and 0%, surgery/dental surgery 0% and 0%, blood transfusion 20% and 50%, family history of HBV infection 60% and family history of HCV infection 0% respectively (Table 5, Figure 9). In the same way the identified associated epidemiological risk factors in prevalence of hepatitis B and C in rural areas were economic status (poor 80% and 62.5%, middle 10% and 25%, rich 10% and 12.5%), injection user 20% and 37.5%, ear/nose piercing 20% and 0%, hospitalization 10% and 0%, surgery/dental surgery 0% and 0%, blood transfusion 10% and 12.5%, family history of HBV infection 40% and family history of HCV infection 25% respectively (Table 6, Figure 10). A number of studies had been conducted to locate the risks factor of hepatitis B virus and hepatitis C virus positivity among general population.

The findings of the present study confirmed that these risk factors were responsible for acquiring hepatitis 'B' and hepatitis 'C' virus infection in our urban and rural areas school going children. Similar results about the epidemiological risk factors responsible for acquiring hepatitis virus infection reported by Razi-ul-Hussnain et al. (2007). Similar findings by different studies have been reported that sharing of needles/syringe, poorly sterilized surgical instrument, ear/nose or body piercing and tattooing were the high-risk activities in the transmission of HBV and HCV (Theodore and Jamal 2006; Idrees et al., 2008; Farhana et al., 2009). The findings of the present study were supported by Mohsen et al. (2015) that the risk factors for acquiring of anti-HCV infection were illiteracy, invasive medical procedures. The findings of the risk factors in the present study were evaluated with previous studies designed in Egypt (Kandeel et al., 2012). Similarly, a dermatologist Gibbs et al. (2000) had observed practices of the cosmetology, injury to the cuticle i.e., nail files, ear/nose and body piercing for tattoos were the risk factors for acquiring infection of hepatitis B and C virus. Hospitalization was also a risk factor in acquiring Hepatitis B and Hepatitis C. Hauri et al. (2004) reported that about 2 million infections of HCV annually acquired from germ-infested injections by healthcares globally and may account approximately 40% of the entire HCV infections. Similar results were reported by Mohsen et al. (2015) that mostly injections therapy in hospitals during admission in hospitals by IV therapy was a risk factor for acquiring infection of hepatitis B and C virus. In another study by Mohsen et al. (2015) stated that persistent poor medical measures were still main risk for acquiring new infection of HCV in Egypt. The findings of the present study were appraised by the results of Karaca et al. (2006) who stated about the most common risk factor for the spreading of HCV was surgery during admission in hospitals of Turkey.

Another risk factor observed in this study was usage of unsterile dental equipments by quacks. This was in agreement with the study by Nima et al. (2013) and Asad et al. (2009). Ali et al. (2011) found 14.2% to 16.2% occurrence of HCV infection among high risk group undergoing dental surgery in Khyber Pakhtunkhwa Pakistan. Shoaib et al. (2011) stated that incidence of HBV and HCV in southern part of KPK Pakistan is alarming and the main risk factors were dental procedures by quacks. Higher occurrence of hepatitis virus in the present study of rural community might be due to low economic status. The other risk factors for acquiring the infection of hepatitis B and C in the present study were similar with Razi-ul-Hussnain et al. (2007) according to their study the risk factors were hospital admissions, unsafe injection therapy and surgery, injection and unsafe blood transfusion and economic status.

The awareness about risk factors to acquire infection of HBV and HCV was insufficient in the population of the present study. It is necessary that common persons should acquire proper awareness about the expansion of this disease and its related risk factors and precautions. Awareness programs are necessary to reduce the future load of hepatitis 'B' and 'C' in school going children of rural and urban areas. Similar views were given by (Alam and Naeem, 2007; Ahmad et al., 2007; Akhtar and Rozi, 2009; Waheed et al., 2009). The present epidemiological data would help us not only to develop best strategies to reduce the burden of hepatitis B and hepatitis C virus but also support the public health policies to address the rising endemic of these diseases that may affect a large number of populations. So, it was most important to identify the current risk factors for prevalence of acute HBV and HCV infection of school going children of our community. Strategies are urgently needed to improve the awareness and control of hepatitis viral infection. However, additional studies are also needed to fulfill this basic gap in our

knowledge about the right burden of hepatitis ‘B’ and hepatitis ‘C’ infection in rural and urban areas of District Muzaffar Garh.

However, the present study results were in agreement with the fact that females were more affected by HCV infection as was indicated by HCV prevalence of 100% in females in urban areas and 0% in the male’s population (Table 3 and Figure 5). The higher incidence of hepatitis ‘C’ virus among females of urban area could be explained on the basis that these female subjects might be more repeatedly exposed to anti-HCV possibly risk factors which was quite evident by their life style, more interaction with minor/major surgery, hospitalization, household contacts, during pregnancy (blood transfusion and therapeutic injections), ear/nose piercing, lack of awareness, illiteracy and surrounding environment. According to Hamid et al. (2004) females were likely to be the higher victims of hepatitis ‘C’ infection than males because of higher contact to surgery, contaminated syringes, needles and blood transfusion, and ear/nose piercing especially where female have low literacy rate and less awareness. Similar outcomes were by Bibi et al. (2013) according to them HCV positivity in females was due to use of therapeutic injections, blood transfusion and sharing household products of HCV infected patient. However, higher prevalence of HBV and HCV 80% and 75% respectively in rural area i.e., 4.59% was observed in males as compared to females 20% and 25% in the present study as shown in Table 4 and Figure 6. These finding were in accordance to the PMRC study, in which gender-wise analysis showed its slight preponderance in males all over Pakistan (PMRC, 2007-2009).

CONCLUSION

The higher frequency of HBV infection among males in rural areas of Muzaffar Garh needs more attention and could be explained on basis that these male’s hosts might be more frequently exposed to HBV infection, and the source of exposure to hepatitis ‘B’ virus infection in males might be different from females i.e., high interaction with health care staff for blood transfusion as donor, with barber/saloon, use of unnecessary injections, occupation, lack of awareness, illiteracy and surrounding environment. Unnecessary injections commonly used by health care staff in Pakistan are a common risk factor for hepatic viral infection (Janjua et al., 2006; Altaf et al., 2009). According to Janjua (2003) Pakistani community routinely use reused and unsterile syringes due to low socioeconomic status i.e., financial limitations and generally lack of awareness. WHO estimated people receives around average of four injections annually in South East Asia; most of which i.e., 75% were reused, unsafe and unnecessary (Hutin et al., 2003). This reused, unsafe and unnecessary injection in Pakistani population is a common risk factor in prevalence of hepatitis virus infection. According to Janjua and Nizamy (2004) visit to saloon can be a causative risk factor in spread of hepatitis virus infection in males by reused razors. Similar results in Pakistani community of Rawalpindi and Islamabad by Bari et al. (2001) who observed risk factors of hepatitis virus infection i.e., contaminated instruments used by barbers. Similarly, Gibbs et al. (2000) reported that reused razors, scissors, nail cutting by barber industry and tattoo piercing instruments mostly used by males were the risk for incidence of hepatitis B and C virus.

ACKNOWLEDGMENT

Financial assistance provided by Higher Education, Pakistan SRG project no.1863 is gratefully acknowledged. We thank to participants who donated blood in this project.

RECOMMENDATIONS

The prevalence of HBsAg and HCV was high in poor and middle economic status children. This means further research is required on economic risk factors affecting transmission of hepatitis B and C among adolescents within our community.

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