

## FREQUENCY OF HEPATITIS B AND C INFECTIONS IN THE GENERAL POPULATION OF LAHORE, PAKISTAN

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### ABSTRACT

*In the recent times, viral hepatic infections (HBV and HCV) have become common and the most important cause of liver disease. It is posing a great health problem especially in the developing world. The importance of hepatitis B and hepatitis C is illustrated by the fact that these infections are imposing a heavy burden on national economy and individual families due to considerable morbidity and mortality from both acute infection and chronic sequelae including chronic active hepatitis, cirrhosis and hepatocellular carcinoma. The present study was carried out to determine the frequency of HBV and HCV infections in the general population of Lahore and to highlight the magnitude of the problem. The study was conducted during the 'Free Hepatitis Camp' held at Services Hospital, Lahore - Pakistan for a period of one week from May 18 to May 25, 2007. It is a descriptive / cross sectional study. Blood specimens were collected using approved medical techniques and tested for HBsAg and anti-HCV on 3<sup>rd</sup> generation ELISA system. This study was conducted in the general population of Lahore and a total of 992 subjects were screened for both hepatitis B and C. Sero-positivity for hepatitis B and C were detected in 30.94% of the subjects. The prevalence of HCV among the total subjects studied was 21.7%, hepatitis B, 8.06% and hepatitis B and C (dual infection) 1.31%. Sero-prevalence in females and males of HBsAg was 1.61% and 6.45% and of anti HCV antibodies 10.38% and 11.19% respectively. It is concluded that about 1/3<sup>rd</sup> of the studied population is sero-positive for hepatitis B or hepatitis C or both infections and this figure is alarmingly high. It further concludes that the frequency of HCV infection is much more common than that of HBV. It raises concern about the increasing disease burden in future and effectiveness of preventive programs/methodologies. Practical implementation of recommended preventive measures in true sense is crucial to prevent or at least reduce the consequences of viral hepatitis in risk groups. There is considerable HCV and HBV threat to our population and require a genuine need for strict adherence to preventive measures.*

**Key words:** *Hepatitis B, Hepatitis C, Prevalence, General Population of Lahore.*

### INTRODUCTION

Hepatitis can be caused by viruses, drugs and toxic agents, the clinical manifestations of which are quite similar. Only recently, viral hepatitis has emerged as a big health problem globally and has been differentiated into 5 major types with the development of serological tests for specific markers. Hepatitis B was identified during World War II whereas hepatitis C was increasingly recognized in 1989.<sup>1,2</sup> The World Health Organization (WHO) estimates that more than 2 billion people show evidence of past or current HBV infection and over 350 million people are chronic carrier's, and about 170 million individuals are infected with hepatitis C virus (HCV) globally.<sup>3,4</sup>

Viral hepatitis has become a disease of major significance and concern in terms of morbidity and

mortality. Regardless of the cause, all types of viral hepatitis affect liver cells. This accounts for the fact that many signs and symptoms for the various types are similar and not specific to the causative agent. The clinical picture of viral hepatitis is extremely variable, ranging from asymptomatic infection without jaundice to a fulminating disease and death in a few days.<sup>2-5</sup> Diagnosing the specific agent responsible for viral hepatitis is not possible clinically and a definite diagnosis of viral hepatitis is only achievable only by the use of viral-specific hepatitis markers.<sup>3,6-7</sup>

Viral hepatitis (HBV and HCV) is highly endemic in Pakistan. The overall prevalence in Pakistani population varies widely but accurate epidemiological information is quite limited. It fluctuates between 1.52% and 8.4% for HBsAg<sup>8-9</sup> and 2.56% to

13.5% for anti-HCV antibodies.<sup>10-11</sup> The purpose of the current study was to evaluate the magnitude of this disease in the general population of Lahore.

## SUBJECTS AND METHODS:

*Study Design:* Descriptive/cross sectional study.

*Location and Duration of Study:* This study involved detection of viral hepatitis markers- HBsAg and anti- HCV in blood samples collected from individuals who participated in the 'Free Hepatitis Camp' held at Services Hospital, Lahore, from May 18, 2007 to May 25, 2007.

*Subject's data:* One thousand eighty eight (1088) subjects were registered in the present study. Among them ninety six (96) were rejected on the basis of various exclusion criteria. A total of 992 participants of either sex, between < 1 and > 60 years of age, (median age: 30.0 ± 12.37 years, standard error 0.39 and C.I. 95%), with different religious, social, professional and educational backgrounds, donated blood voluntarily. Among them 617 of them were males and 375 females respectively (Table 1). All subjects were self motivated and beyond recording age and gender, no attempt was practicable to obtain any history of contact or likely mode of infection associated with those whose blood tested were HBsAg or anti-HCV reactive.

*Distribution of Subjects According to Age:* Participants were divided into seven different age groups: Group 1 (≤ 9 years), Group 2 (10-19 years), Group 3 (20-29 years), Group 4 (30-39 years), Group 5 (40-49 years), Group 6 (50-59 years) and Group 7 (≥ 60 years) (Table 1). The youngest who participated in this study was two (2) years old. Large numbers of participants were in 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> decade of their life in both genders (Figure 1).

*Collection of Blood Specimens and Preparation:* No special preparation of the subjects was required prior to specimen collection. Blood was collected by approved medical techniques. Sera were separated and analyzed on the same day of collection or refrigerated overnight. Markedly haemolytic specimens that may offer false positive or negative results were excluded from the study.

*Immunoassays:* The screening was performed in the clinical laboratory of Services Hospital, Lahore. HBsAg and anti-HCV 3<sup>rd</sup> generation ELISA kits were used to screen all blood specimens. Following instrument and kits were used. Multiskan -EX (Thermo Electron Corporation, Finland), Ortho HCV 3.0-ELISA Test System Enhanced SAVE (sample addition verification) and MONOLISA HBsAg Ultra (Bio-Rad, France).

*Statistical Analysis:* SPSS version 12.0 was applied for statistical analysis. The X<sup>2</sup> (Chi-square) test with

Yates correction was used for qualitative variables- to check the relationship of HBV and HCV infections with age and sex. Percentages were calculated directly for HBV and HCV. Statistical significance was accepted at a level of P < 0.05.

## RESULTS

During this study, blood specimens of 992 participants were screened for both hepatitis B and C. Female participants were 37.80% and males 62.19% of the studied population (Table 2).

After screening, 30.94% (307/992) were found to be sero-positive for HBsAg, anti-HCV or both. Amongst them 21.57% were positive for hepatitis C, 8.06% for hepatitis B, and 1.31% for dual infections (hepatitis B and C) (Table 1). The proportion of hepatitis C amongst the total sero-positive cases of viral hepatitis was 69.70%, hepatitis B 26.05% and for dual infection (HBV and HCV) 4.23% and statistically the difference was highly significant (P < 0.001) (Figure 2)

Out of total subjects screened, 214 including 103 females and 111 males were sero-positive for anti-HCV antibodies (Table 2 and 3). These tables further reveal that 11.19% males and 10.38% females were sero-positive for HCV (M: F ratio of 1.07:1). Infection rate of both genders was showing male predominance but statistically, difference was non-significant (P > 0.05). The overall sero-positivity for HBsAg was 8.06% (80/992), and percentage distribution of HBsAg in males and females was 6.45% and 1.61% respectively (Table 1 and 2). Male to female ratio was 4.0:1 and statistically, this difference was highly significant (P < 0.001). The sero-positivity for dual infections was 1.31% (Figure 2 and Table 1).

The maximum number of HBsAg reactive subjects (35.0%) was detected in the age group 3 and peak prevalence of anti-HCV (34.58%) was observed among persons 30 to 39 years of age (Group 4) (Table 1). The dual infection was more frequent in the age group 3 (Table 1). HBsAg reactivity was 0.00% and lowest (0.47%) for HCV in the age group 1, respectively (Table 1). In geriatric age group (those ≥ 60 years), frequency of HBsAg and anti-HCV was 1.25% and 3.27% of all cases, respectively. In this group, among 19 cases screened, 7 (36.84%) were found sero-positive for anti-HCV antibodies (Table 3).

## DISCUSSION

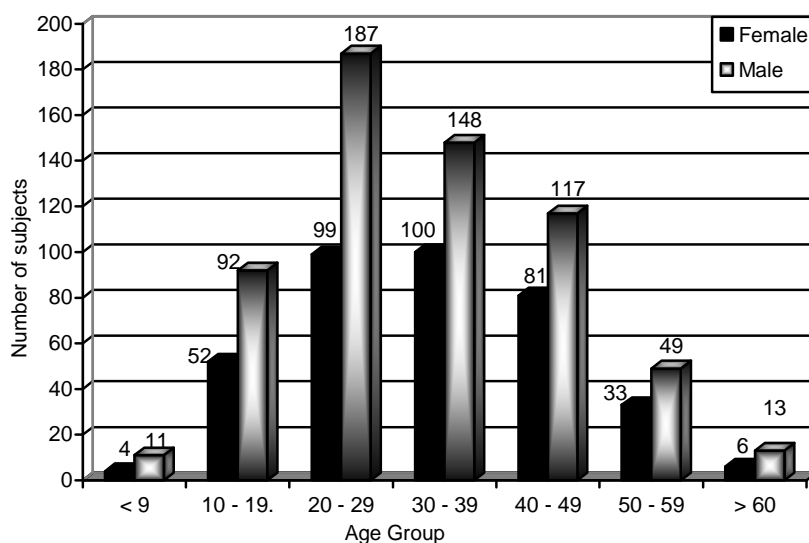
The current study included 992 randomly selected, self motivated, apparently healthy individuals of a fairly representative population of Lahore as regards to gender, age and socio-economic status. Since it is a cosmopolitan city, this represents a cross

sectional sample of all the people belonging to different categories, educational background and professions and thus reflects the general population.

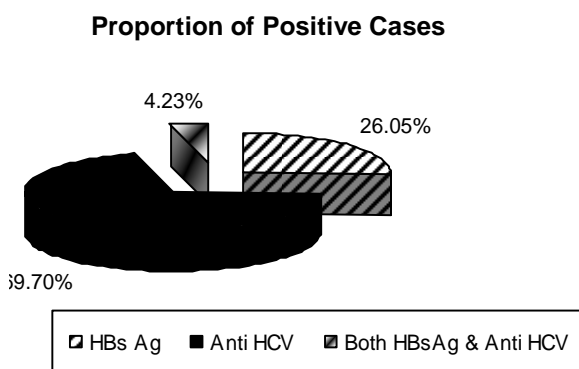
An overall 30.94% HBsAg and anti-HCV prevalence was recorded among the participants of this study, suggesting that about 1/3<sup>rd</sup> of the population in Lahore are infected with HBV and HCV, making this a serious public health concern. The current study also revealed that hepatitis C infection (21.57%) is much more frequent than hepatitis B (8.06%) in the studied population. Our study represents a random population without any gender, age and socio-economic status differentiation that may reflect the disease burden in Lahore. A higher percentage of male gender showed positive results for HBsAg compared to hepatitis C. Exposure to HBV and HCV infections increased with increasing age. The prevalence increased from 0.00% and 0.47% in subjects < 9 years of age to 35.00% in group 3 and 34.58% in group 4 for HBsAg and anti-HCV respectively. Anyhow, any inference about the incidence of vertical transmission cannot be drawn from this study.

Data of most of the studies suggest that the prevalence of HBV and HCV infections varies throughout the world. Much of the variability between regions can be explained by the frequency and extent to which different risk factors have contributed to the transmission of HBV or HCV.<sup>4,12-15</sup> The prevalence of chronic HBV infection is lowest (< 1%) in North America, Australia and New Zealand, 2-4% in Japan, 5-18% in China and highest (15-20%) in Taiwan.<sup>16</sup> The lowest prevalence rate of chronic HCV infection (0.01%-0.1%) has been reported from countries in the United Kingdom and Scandinavia; the highest prevalence (15%-20%) has been reported from Egypt.<sup>15,17</sup>

The prevalence of HBV and HCV infection in our study is comparable to and within the range reported from elsewhere, for example prevalence rates as high as 22 % for HCV are reported in Egypt and are attributed to the use of parenteral antischistosomal therapy.<sup>15-17</sup> Wang et al. estimated in Taiwan, a prevalence of 13.8% for HBsAg, 17.0% for anti-HCV, and 2.0% for both HBsAg and anti-HCV.<sup>18</sup> Butsashvili et al. investigated prevalence of hepatitis B and hepatitis C virus amongst blood donors in



**Fig. 1:** Age and Sex distribution of studied population, n=992 (M=617, F=375).



Total Positive cases: [n=992] 307(30.94%); Percentage distribution  
HBsAg+ = 80(8.06%), Anti-HCV+ = 217 (21.57%), Dual= 13(1.31%)  
Total Positive cases: 307(30.94%)

**Fig. 2:** Percentage distribution of viral hepatitis and proportion of hepatitis B and C amongst total reported positive cases of hepatitis.

in Georgia and reported that HBsAg and anti-HCV was reactive in 4.1% and 7.3% respectively.<sup>19</sup> Anti HCV frequency of 13.5% and 17.77% has been reported from within Pakistan.<sup>11,20</sup> In a study from Saudi Arabia, Qureshi et al reported HBV and HCV prevalence rate of 13.2% and 35.8% respectively, among apparently healthy Pakistanis and 38.0% and 16.8% respectively among apparently healthy Nigerians working in Makkah region of KSA.<sup>21</sup>

A few studies are available about the prevalence of hepatitis B and C in the general population of Pakistan and reported very able variable figs. Many

reported studies indicate that Pakistan falls into intermediate to highly endemic range for hepatitis B and hepatitis C infections.<sup>8-9,10-11,22-23</sup> In the present study the prevalence of HBsAg and anti HCV antibodies was 8.06% and 21.57% which falls in the high endemic zone.

However, studies in selected groups have shown variable frequency of HBV and HCV infections as assessed by HBsAg and anti-HCV sero-positivity: HBsAg positivity was 2.4% in health care providers,<sup>24</sup> 1.52 - 8.4% in volunteer blood donors,<sup>8-9,25</sup> 3.0 - 7.3% in young males during pre-employment screening in different areas of Pakistan,<sup>26-28</sup> 2.6 - 7.31% in general population<sup>10-11,23,29</sup> and 1.1% in high socioeconomic class.<sup>30</sup> Prevalence of anti-HCV antibodies was detected in 5.6% of health care workers,<sup>23</sup> 1.1 - 5.34% in blood donors,<sup>8-9,11,25</sup> 2.22 - 5.2% in young male adults seeking recruitment in Pakistan armed forces,<sup>26-28</sup> 3.3 - 17.77% in general population<sup>10-11,20</sup> and 2.1% in individuals of high socioeconomic status.<sup>30</sup>

During the last decade, many studies were carried out and guidelines for prevention and control of viral hepatitis in Pakistan were formulated according to the internationally recommended guidelines. Despite all these efforts, graph of hepatitis B and hepatitis C infected persons is ascending in our population.

From the present study and other studies, it can be assumed that hepatitis C has become a major cause of viral hepatitis than hepatitis B in our region. However, the relatively high seroprevalence of both HBV and HCV merits mandatory screening of the general population and high-risk individuals. This should be supplemented with health education of general population to increase awareness about

**Table 1:** Distribution of Hepatitis B and C reactive cases in different age groups (n = 992).

Age Group	Age (Years)	Subjects Screened	Anti-HCV reactive cases	HBs Ag reactive cases	Dual (B&C) reactive cases
Group 1	≤ 9	15	1 (0.10%)	0 (0.00%)	0 (0.00%)
Group 2	10 - 19	144	8 (0.80%)	13 (1.31%)	0 (0.00%)
Group 3	20 - 29	286	49 (4.94%)	28 (2.82%)	6 (0.60%)
Group 4	30 - 39	248	74 (7.46%)	19 (1.91%)	2 (0.20%)
Group 5	40 - 49	198	56 (5.64%)	15 (1.51%)	5 (0.50%)
Group 6	50 - 59	82	19 (1.91%)	4 (0.40%)	0 (0.00%)
Group 7	≥ 60	19	7 (0.70%)	1 (0.10%)	0 (0.00%)
Total		n= 992	214 (21.57%)	80 (8.06%)	13 (1.31%)

**Table 2:** Sex wise distribution of HBV and HCV sero-positive subjects.

Subjects		Anti-HCV reactive cases		HBsAg reactive cases	
Sex	Total No.	Frequency	Percentage (n = 992)	Frequency	Percentage (n = 992)
Male	617 (62.19%)	111 (17.99%)	11.19%	64 (10.37%)	6.45%
Female	375 (37.80%)	103 (27.46%)	10.38%	16 (4.26%)	1.61%
Grand total	992	214 (21.57%)	21.57%	80 (8.06%)	8.06%

HBV and HCV infections, their modes of transmission and consequences. The large reservoir of viral hepatitis in the community provides an opportunity to investigate risk factors for transmission, the natural history of infection and effectiveness of preventive methodologies. It also raises concern about the prospects of an increasing incidence of chronic liver disease and its complications like cirrhosis and hepatocellular carcinoma in future as the infected population gets older.

Chronic viral hepatitis is a serious disease not only from the medical but also social aspect. The burden of HBV and HCV disease and efforts to control infection will determine the future size of the population requiring treatment of HBV and HCV infections. The treatment is expensive, toxic its response rate is less than satisfactory.<sup>3,4,17</sup> Life threatening late consequences of the disease is a problem

that affects not only the health care but also social sphere. Prophylactic measures are crucial to prevent or at least reduce the consequences of viral hepatitis in risk groups.<sup>4-5,14,17</sup> However, these measures are time consuming and financially extremely demanding. It is further established that the need of the day in the developing countries is: change of attitude/ mind set; implementation of formulated preventive measures/related laws in true sense and good governance to minimise further spread.

In **conclusion** the frequency of chronic viral hepatitis (30.94%) is quite high and alarming in the studied population, suggesting that about 1/3<sup>rd</sup> population in Lahore is infected with HBV and HCV, making this a serious public health concern. It is further concluded that HCV infection has become a much more common cause of viral hepatitis than HBV. The extent of the recorded prevalence values calls for the implementation of programs aimed at detecting clusters or population areas at risk. This information would be of great help in developing or formulating preventive measures and their practical implementation according to local circumstances and experience. Anyhow, further studies are needed at the national level - with representation from across the country to ascertain the actual disease burden in the general population of Pakistan.

#### LIMITATIONS OF THE STUDY

This study took place at Lahore, a heavily populated, cosmopolitan city of Pakistan and the results may not apply to other geographic areas.

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**Table 3:** Distribution and proportion (%) of Hepatitis B and C reactive cases.

Subjects		Anti-HCV reactive cases		HBsAg reactive cases	
Age Group	Subjects Screened	Frequency	Percentage (n=214)	Frequency	Percentage (n=80)
Group 1	15	1	0.47%	0	0.00%
Group 2	144	8	3.74%	13	16.25%
Group 3	286	49	22.90%	28	<b>35.0%</b>
Group 4	248	74	<b>34.58%</b>	19	23.75%
Group 5	198	56	26.17%	15	18.75%
Group 6	82	19	8.88%	4	5.00%
Group 7	19	7	3.27%	1	1.25%
Total	n = 992	214	100.00%	80	100.00%

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