BioScientific Review (BSR)

Volume 3 Issue 1, 2021

ISSN(P): 2663-4198 ISSN(E): 2663-4201

Journal DOI: https://doi.org/10.32350/BSR

Issue DOI: https://doi.org/10.32350/BSR.0301

Homepage: https://journals.umt.edu.pk/index.php/BSR

Article: **Epidemiological Survey of the Prevalence of HCV and HBV among the Factory Workers in the Periphery of Lahore**

Author(s): Muhammad Khurram[1], Asma Irshad[2]*, Muhammad Alamgir[3], Usman Ayub Awan[4], Haleema Sadia[5], Ammna Sayeed[6]

Affiliation:
[1]Pride Lab, Lahore-Pakistan
[2]Centre of Excellence in Molecular Biology, University of Punjab, Lahore, Pakistan
[3]Department of Pathology, Central Park Medical College, Lahore-Pakistan
[4]Medical Laboratory Technology, Haripur University-Pakistan
[5]Department of Biotechnology, BUITMS, Quetta-Pakistan

Article DOI: https://doi.org/10.32350/BSR.0301.03

Citation: Khurram M, Irshad A, Alamgir M, Awan UA Sadia H, Sayeed A. Epidemiological survey of the prevalence of HCV and HBV among the factory workers in the periphery of Lahore. *BioSci Rev.* 2021;3(1):25–33.

Journal QR

Article QR

Muhammad Khurram

Indexing

Google Scholar

EuroPub

A publication of the
Department of Life Sciences, School of Science
University of Management and Technology, Lahore, Pakistan

Research Article

Epidemiological Survey of the Prevalence of HCV and HBV among the Factory Workers in the Periphery of Lahore

Muhammad Khurram[1], Asma Irshad[2*], Muhammad Alamgir[3], Usman Ayub Awan[4], Haleema Sadia[5], Ammna Sayeed[6]
[1]Pride Lab, Lahore-Pakistan
[2]Centre of Excellence in Molecular Biology, University of Punjab, Lahore- Pakistan
[3]Department of Pathology, Central Park Medical College, Lahore-Pakistan
[4]Medical Laboratory Technology, Haripur University-Pakistan
[5]Department of Biotechnology, BUITMS, Quetta-Pakistan
[6]Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, Pakistan
*Corresponding Author: asmairshad76@yahoo.com

Article Info

Received: Jan 6th, 2021
Revised: May 19th, 2021
Accepted: May 21st, 2021

Keywords:

Enzyme linked Immunosorbent Assay (ELISA)
hepatitis C virus (HCV)
hepatitis B virus (HBV)
higher prevalence

Abstract

Hepatitis C and hepatitis B are major health-related issues all over the globe. Both of these are iral infections that can be disseminated via sexual contact, by blood or the use of blood products, and through methods of intra-familial transmission. The collection of blood samples of factory workers was done aseptically at KBK Electronics. Overall, 272 samples of blood were taken from a variety of individuals. Economically accessible ELISA (Enzyme linked Immunosorbent Assay) was used to screen the individuals for Hepatitis B surface Antigen (HBsAg) and also for anti- HCV antibodies. Screening test was performed as directed by the instructions of the manufacturer. Name, gender and age group of each person was noted. Overall, 271 individuals were inspected to check the presence of HCV and HBV. The age of all the individuals ranged between 19 -50 years. The overall prevalence of both HCV and HBV was determined as 18.4% (50/271). As compare to HBV, HCV has a higher prevalence, that is, 16.17% (44/271). On the other hand, the prevalence of HBV was only 2.2% (6/271). The results of this study and previous literature highlight the pressing need to conduct epidemiological studies in smaller regions of the country. It will help to specify the areas with higher HCV/HBV prevalence. Only then, various methods for treating and even precluding both of these infections can be implemented effectively.

1. Introduction

Hepatitis C and hepatitis B are major health-related issues all over the globe [1]. Both of these are viral infections that can be disseminated via sexual contact, by blood or the use of blood products, and through methods of intra-familial transmission [2]. According to the World Health Organization (WHO), approximately two billion individuals have been exposed to Hepatitis C virus, out of which 240 million are long lasting carriers [3]. Both hepatitis B and hepatitis

C are global health issues. Globally, an estimated 240 million people are chronically infected by Hepatitis B virus (HBV) and an estimated 130 to 150 million individuals are infected by Hepatitis C virus (HCV) [3, 4]. Approximately, 1.45 million deaths occur annually due to HCV and HBV, which comprise 96% of all deaths related to hepatitis [5]. Globally, the chronic infection of hepatitis and HIV are among the ten most fatal diseases [6]. Pakistan counts as one of the most beset countries affected by HCV and HBV. As compared to other countries in the same region including Myanmar, India, Iran, Afghanistan and Nepal, Pakistan has a much higher rate of seropositivity and pathogenicity of HCV [7]. In order to observe the prevalence of HBV and HCV, many studies were carried out in Pakistan at various locations [8, 9, 10]. However, a limited number of individual studies are available about the prevalence of HBV and HCV in certain areas of Pakistan [9]. This is due to the fact that epidemiological experiments related to the prevalence of HBV and HCV were limited to the patients admitted into the hospitals [11, 12]. Pakistan Medical Research Council (PMRC) carried out a survey throughout the country over a period of 10 months. This survey started in July 2007 and ended in May 2008. It showed that the prevalence of HBV is 2.5% and that of HCV is 5% in the general population. In Pakistan, it was shown by a gender-focused study that the prevalence of HBV is slightly higher in males than females, although the prevalence of HCV showed no such difference [10]. There is 3% prevalence of HCV all over Pakistan (the range is 0.5%-31.9%) as specified by another small scale analysis which highlighted its notable disparity of occurrence across the different regions of the country [8]. At the provincial level, the prevalence of HBV was highest in Baluchistan with 4.3%, whereas in the province of Sindh it was 2.5%, in Punjab it was 2.4% and in Khyber Pakhtunkhwa it was 1.3%. On the other hand, the occurrence of HCV was highest in the province of Punjab with 6.7%, in Sindh it was 5.0%, in Baluchistan it was 1.5% and it was the lowest in Khyber Pakhtunkhwa at 1.1% [12]. The prevalence of HBsAg was 2.4% in the province of Punjab and it was 6.7% for HCV. In some districts of Punjab including Okara, Attock, Vehari, Mianwali, Jhang, Gujranwala, Rahim Yar Khan and Mandi Bhauddin, comparatively higher ratios of the pervasiveness of HCV and HBV were observed. The occurrence of HBV was specified to be 2.9% in District Gujranwala in Punjab with an estimated 112,000 individuals infected by it. Furthermore, the prevalence of HCV was 6.3% in the same district with approximately 243,000 people infected by it [10]. In District Gujranwala, the prevalence of HCV was reported to be 23.8% [13]. There is an inadequate amount of population level detail and information regarding HBV and HCV occurrence within Gujranwala. Seemingly, students come into contact with many HCV and HBV risk factors which causes them to be at a greater risk of becoming infected by them. For the student population at college level, there is not much information available regarding the prevalence of HBV and HCV

Within the province of Punjab Lahore is the foremost industrial district and it is densely populated. The purpose of this study was to estimate the prevalence of HCV and HBV specifically among the factory workers residing in the periphery of the Lahore city.

2. Materials and Methods

Collection of blood samples from factory workers was done aseptically at KBK Electronics after the approval of the ethical committee, Central Park Teaching Hospital, Lahore following standard

operating procedures (SOPs). A sterilized gel vacutainer was used to collect samples from KBK Electronics Pvt. Ltd. located at 31-KM Ferozpur road, Lahore. The samples were immediately brought to the laboratory at the Central Park Teaching Hospital, Lahore. Overall, 272 samples of blood were taken from a variety of individuals. Economically accessible ELISA (Enzyme linked Immunosorbent Assay) was used to screen the individuals for HBsAg and anti- HCV antibodies [14]. Screening test was performed as directed by the instructions of the manufacturer. Name, age, and sex date of each person was collected. Percentage of HBV and HCV prevalence was calculated.

2.1. Enzyme linked Immunosorbent Assay

The ELISA utilized in order to measure the concentration of IgG anti-capsular antibody was modified by the procedure specified by Plikaytis *et al.* [15]. This modified form of ELISA was prepared to be used as a model for doing analysis particularly for the current study. It is not proposed to be a standard form of ELISA intended for general use in all Hepatitis B and C antibody concentration determinations. For the preparation of each reagent, highly pure water available in both the laboratories was utilized. In order to specify the optimal concentration of the polysaccharide coating on each polysaccharide, block titration was performed in a 0.01M solution of PBS (sodium phosphate buffered saline) having the pH range 7.1-7.2 for each polysaccharide. Moreover, block titrations of the conjugate enzyme and standard reference serum (89-SF) were also performed. The dilution of the samples of serum to 1:50 final to starting ratio was advisable. A 0.01 M solution of PBS-0.05% polysorbate 20 containing immunoassay-grade enzyme (EIA) 1% BSA (Bovine Serum Albumin) was utilized for all the dilutions, for 89-SF(standard reference serum), quality control sera, serum samples, conjugate enzyme and also for polysaccharides of the cell wall (C-Ps). The neutralization of quality control sera, 89-SF and all samples of serum was performed by utilizing C-Ps in a pure and non-diluted serum at final concentration of 500 mg/ml. This was done at room temperature for a minimum duration of 30 minutes. Then, all the samples of serum and 89-SF were diluted in a sequential manner after their neutralization was completed. Two-, three- or six-fold sequential dilution was the commonly endorsed stratagem.

The concord ELISA comprised 100 ml of Hep B and C antigen polysaccharide coating at 37°C on each one of the wells of Nunc-Immuno plates. These coated plates were completely utilized in a period of one month and were kept at a temperature of 4°C for storage. A 0.01 M solution of phosphate-buffered saline–0.1% Polysorbate 20 (having pH range 7.4 to 7.6) was used for the purpose of washing these coated plates five times. Then, the samples of serum (50 ml per well), sequentially diluted standard reference serum (89-SF) and C-Ps duplicated neutralized antibodies were added. Intramural incorporation of wells related to quality control and background (wells comprising all the reagents but excluding the samples of serum) was done in all the evaluation tests. The cultivation of diluted samples was done at room temperature for a time period of two hours. Then, the coated plates were washed using the same method mentioned earlier. Afterwards, horseradish peroxidase-labeled (HRP) conjugate enzyme (HP6043; Hybridoma Reagent Laboratory, Baltimore, Md.) solution was taken and 50 ml of this solution was appropriately diluted and incorporated into every well. Incubation or cultivation of this enzyme conjugate was done at room temperature for a minimum time period of two hours. Then, 3,39,5, 59-

Table 1. Prevalence Pertaining to Both HCV and HBV Among Individuals at KBK Electronics Pvt. Ltd. Lahore

	Prevalence of Hepatitis		
	Total Subjects	**Positive Cases**	**Prevalence (%)**
Male	271	50	18.4
	Prevalence of Hepatitis B		
Male	271	06	2.2
	Prevalence of Hepatitis C		
Male	271	44	16.2

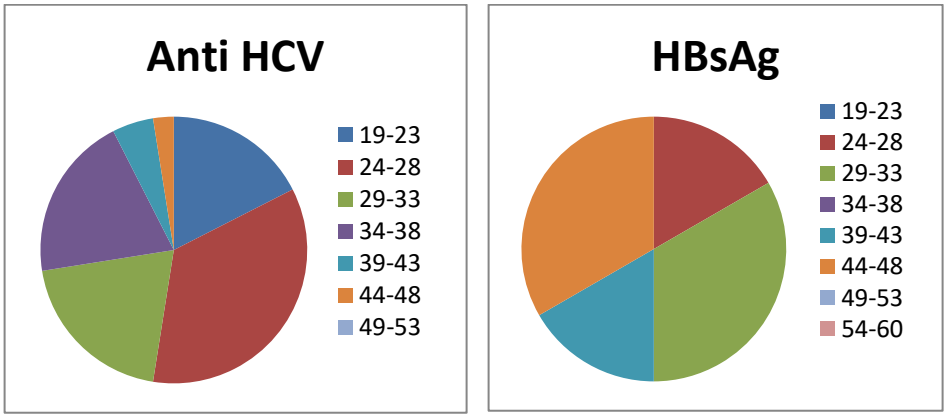

Figure 1. Age wise distribution of hepatitis B and hepatitis C. The age group of 24-28 years shows heights prevalence of HCV whereas HBV is more prevalent in 29-33 years and 44-48 years

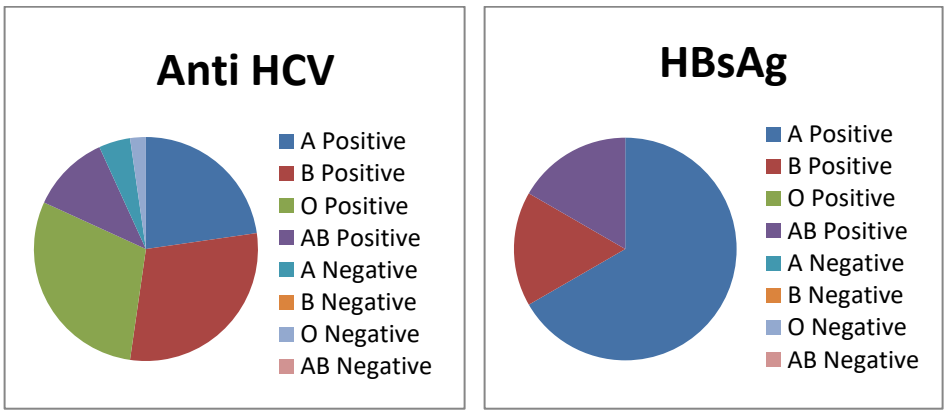

Figure 2. Distribution of hepatitis B and C positive cases in individuals with different blood groups. Anti-HCV was more prevalent in B positive and O positive blood groups, while HBsAg was prevalent in the A positive blood group

tetramethylbenzidine was taken as a substrate and was incorporated into every well, based on the directions of the manufacturer. Lastly, at room temperature, the incubation of the coated plates was performed and the termination of the reaction of the enzyme occurred. The readings for the optical density of every well were taken and recorded as 450 nm.

3. Results

Overall, 271 individuals participated in this study and each one of them was inspected for the presence of HCV and HBV. The age range of the participating individuals was between 19-50 years. The prevalence of both HCV and HBV was determined as 18.4% (50/271). The overall prevalence of both HCV and HBV was determined as 18.4% (50/271). As compare to HBV, HCV has a higher prevalence, that is, 16.17% (44/271). On the other hand, the prevalence of HBV was only 2.2% (6/271). Moreover, one participant was found to be infected with both HBV and HCV. However, overall the prevalence of HCV (44/271) among subjects was more common in comparison to HBV (6/271) (Table 1). There is a greater prevalence of HCV among subjects compared with HBV. The prevalence of HCV infection is 16.2% and that of HBV infection is 2.2%.

Two age groups predominantly affected by HBV were 29-33 years and 44-48 years as opposed to the cases of HCV, in which the predominantly affected age group was 29-33 years. These results were observed in the male population (Figure 1).

The comparison of the blood group and age wise data of both HBV and HCV individuals revealed that anti-HCV was more prevalent in B positive and O positive blood groups, while HBsAg was prevalent in the A positive blood group (Figure 2). According to the age wise distribution, prevalence of HCV along with HBV was high among the age group 29-33 years.

4. Discussion

According to different studies, there is high prevalence of HCV and HBV in the provinces of Sindh and Punjab in Pakistan [16, 17, 4]. Approximately, 3% of the entire population of the globe (which is roughly equal to 180 million individuals) is infected by HCV, according to estimates of WHO [18]. Each year the number of infected individuals reaches approximately 3 million to 4 million and 70% of them later on suffer from hepatitis in its chronic form [1]. In about 50-75% of the cases relevant to liver cancer, HCV is the main causative agent [19]. HBV infection is also a health issue worldwide and the number of people infected by it globally is around two million [20, 21]. Furthermore, the chronic form of HBV has infected an estimated 400 million individuals around the globe [22]. Among the Pakistani population, the prevalence of HCV and HBV infection is 4.9% and 2.5% respectively, as outlined by a nationwide study organized by PMRC [10].

The current study's main aim was to analyze the prevalence of infection caused by both HCV and HBV in factory workers who were screened after the appearance of their signs and symptoms. It revealed a high percentage of positive results for HCV. The reason behind this high percentage was the appearance of signs and symptoms. Afterwards, they were screened for HCV and HBV. The prevalence of HBV was 2.4% in the province of Punjab, ranging from 0.7%-5.7% depending upon the particular area of the province. This highlights the fact that some areas have a higher prevalence or concentration of the same infection compared to the other areas of the same province. In Gujranwala, the prevalence of HBV was specified as 2.9% which shows that roughly 112,000 people suffer as a

result of this virus and its infection. HBV occurrence in Lahore is more than its neighboring areas such as Gujrat with only 0.8% prevalence, Sheikhupura with 1.6%, Narowal with 2.1%, Sialkot with 2.2% and Hafizabad also with 2.2% prevalence [10]. In the province of Punjab, the prevalence rate of HCV ranges from 1.9%-13.1% in different areas and overall, the frequency of HCV is 6.7%. The prevalence of HCV and HBV among students at college level was observed to be notably lesser (less than 3.0%) than the seropositivity rate of 30% observed among the paid donors and the seropositivity rate of 7% observed among the blood donors of both the replacement and family group of donors. It was previously outlined that the seroprevalence rate of HBV was 5.96% and that of HCV was 0.07% in an analysis of a total of 1426 individuals who donated blood in Liaqatpur [23]. Bangash *et al.* analyzed that among the healthy donors of blood in Kurram Agency, Pakistan, about 5% were tested positive for HBsAg. They also found that for the HCV antibodies, 1.1% of the same donors were tested positive [24]. The overall frequency of HCV and HBV occurrence was determined as 12.99% through a different analysis [25]. In the current study, KBK Electronics Pvt. Ltd. located at 31-KM Ferozpur road, Lahore revealed only 16.2% positive cases of HCV and 2.2% positive cases of HBV. Hence, the prevalence of HCV was comparatively higher in the examined subjects (16.2%). Similar results were also observed through other evaluations conducted in areas within Pakistan in which the occurrence rate of the hepatitis virus among males was predominant [26, 27, 28]. Khan *et al.* previously delineated a much higher frequency of hepatitis C in comparison with hepatitis B in males [23]. A possible cause of this more frequent occurrence of the hepatitis virus among the male population can be that in Pakistan, men spend more time in public spaces and utilizes public services to greater extent than women. Consequently, they are liable to getting infected by hepatitis virus because they can be more easily exposed to a higher number of risk factors for the infection.

5. Conclusion

The results from this study and previous literature highlight the pressing need to conduct prevalence surveys in other fragmented populations. It will help to specify the areas with higher HCV/HBV prevalence. Only then, various methods for treating and even precluding both of these infections can be implemented effectively.

Acknowledgment

All authors are very grateful to the Higher Education Commission of Pakistan for its aid and support.

Conflict of Interest

Authors declare no conflict of interest.

References

[1] Jørgensen A, Bjørn-Mortensen K, Graff Jensen S, Sloth Andersen E, Ravn P. Prevalence of hepatitis B and C at a major tuberculosis centre in Denmark. *Infect Dis*. 2021;53(3):1-5. https://doi.org/10.1080/23744235.2020.1865562

[2] Pruß A, Chandrasekar A, Sánchez-Ibáñez J, Lucas-Samuel S, Kalus U, Rabenau HF. Algorithms for the testing of tissue donors for human immunodeficiency virus, hepatitis B virus, and hepatitis C virus. *Transfusion Med Hemotherapy*. 2021;48(1):12-21. https://doi.org/10.1159/000513179

[3] Gower E, Estes C, Blach S, Razavi-Shearer K, Razavi H. Global epidemiology and genotype distribution of the hepatitis C virus infection. *J Hepatol*. 2014;61(1):S45-

57. https://doi.org/10.1016/j.jhep.2014.07.027

[4] Lim AG, Qureshi H, Mahmood H, et al. Curbing the hepatitis C virus epidemic in Pakistan: the impact of scaling up treatment and prevention for achieving elimination. *Int J Epidemiol*. 2018;47(2):550-60. https://doi.org/10.1093/ije/dyx270

[5] WHO. Global Health Sector Strategy on Viral Hepatitis 2016-2021. 2017. https://www.who.int/hepatitis/strategy2016-2021/ghss-hep/en/

[6] European Association for the Study of the Liver. EASL 2017 Clinical Practice Guidelines on the management of hepatitis B virus infection. *J Hepatol*. 2017;67(2):370-98. https://doi.org/10.1016/j.jhep.2017.03.021

[7] Global Burden of Hepatitis C Working Group. Global burden of disease (GBD) for hepatitis C. The *J Clin Pharmacol*. 2004;44(1):20-29. https://doi.org/10.1177/0091270003258669

[8] Ali SA, Donahue RM, Qureshi H, Vermund SH. Hepatitis B and hepatitis C in Pakistan: prevalence and risk factors. *Intl J Infect Dis*. 2009;13(1):9-19. https://doi.org/10.1016/j.ijid.2008.06.019

[9] Waheed Y, Shafi T, Safi SZ, Qadri I. Hepatitis C virus in Pakistan: a systematic review of prevalence, genotypes and risk factors. *World J Gastroenterol*. 2009;15(45):5647-. https://doi.org/10.3748/wjg.15.5647

[10] Pakistan Medical Research Council. Federal Bureau of Statistics, Pakistan and Ministry of Health, Pakistan. (2018). National Survey on Prevalence of Hepatitis B & C in General Population of Pakistan (2007-2009). Pakistan Medical Research Council, Shahrah-e-Jamhuriat, Sector G-5/2, Islamabad.

[11] Koulentaki M, Ergazaki M, Moschandrea J, et al. Prevalence of hepatitis B and C markers in high-risk hospitalised patients in Crete: a five-year observational study. *BMC Public Health*. 2001;1(1):1-8. https://doi.org/10.1186/1471-2458-1-17

[12] Chaudhary IA, Khan SA. Samiullah: Should we do hepatitis B and C screening on each patient before surgery: Analysis of 142 cases. *Pak J Med Sci*. 2005;21(3):278-80.

[13] Aslam M, Aslam J. Seroprevalence of the antibody to hepatitis C in select groups in the Punjab region of Pakistan. *J Clin Gastroenterol*. 2001;33(5):407-11.

[14] Kowo MP, Yimagou EK, Ndam AW, et al. Prevalence of HBsAg and anti-HCV antibodies during a screening campaign in August 2019. *Open J Gastroenterol Hepatol*. 2021;4(1):45-50.

[15] Plikaytis BD, Goldblatt D, Frasch CE, et al. An analytical model applied to a multicenter pneumococcal enzyme-linked immunosorbent assay study. *J Clin Microbiol*. 2000;38(6):2043-50.

[16] Jafari S, Copes R, Baharlou S, Etminan M, Buxton J. Tattooing and the risk of transmission of hepatitis C: a systematic review and meta-analysis. *Int J Infect Dis*. 2010;14(11):e928-940. https://doi.org/10.1016/j.ijid.2010.03.019

[17] Ali M, Idrees M, Ali L, Hussain A, Rehman IU, Saleem S, Afzal S, Butt S. Hepatitis B virus in Pakistan: a

systematic review of prevalence, risk factors, awareness status and genotypes. *Virol J*. 2011;8(1):1-9.

[18] World Health Organization. Global hepatitis report 2017. World Health Organization; 2017.

[19] Umar M, tul Bushra H, Ahmad M, et al. Hepatitis C in Pakistan: A review of available data. *Hepatitis Monthly*. 2010;10(3):205-2014.

[20] Idrees M, Khan S, Riazuddin S. Common genotypes of hepatitis B virus. *J Coll Physicians Surg Pak*. 2004;14(6):344-347.

[21] Paraskevis D, Haida C, Tassopoulos N, Raptopoulou M, Tsantoulas D, Papachristou H, Sypsa V, Hatzakis A. Development and assessment of a novel real-time PCR assay for quantitation of HBV DNA. *J Virolog Meth*. 2002;103(2):201-12. https://doi.org/10.1016/S0166-0934(02)00033-2

[22] Alam MM, Zaidi SZ, Malik SA, et al. Serology based disease status of Pakistani population infected with Hepatitis B virus. *BMC Infect Dis*. 2007 Dec;7(1):64-69.

[23] Khan MA, Ashraf M, Rehman A, Ali A, Ashraf M, Ditta A. Prevalence of HBV, HCV and HIV in blood donors at Liaquetpur. *Prof Med J*. 2006;13(01):23-26.

[24] Bangash MH, Bangash TH, Alam S. Prevalence of hepatitis B and hepatitis C among healthy blood donors at Kurram Agency. *J Postgrad Med Inst*. 2009;23:140–145.

[25] Ahmad I, Khan SB, Rehman HU, Khan MH, Anwar S. Frequency of hepatitis B and hepatitis C among cataract patients. *Gomal J Med Sci*. 2006;4:2-9.

[26] Khan TS, Rizvi F. Hepatitis B seropositivity among chronic liver disease patients in Hazara Division Pakistan. *J Ayub Med Coll Abottabad*. 2003;15:54–55.

[27] Khan AJ Siddiqui TR. Prevalence of Hepatitis B and C screening in cases undergoing Elective eye surgery. *Pak J Opthalmol*. 2007;23(1):39–44.

[28] Farooqi JI, Farooqi RJ. Relative frequency of hepatitis B and C virus infections in cases of hepatocellular carcinoma in North West Frontier Province. Pakistan. *J Coll Physicians Surg Pak*. 2000;10:128-30.