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Screening of Viral Hepatitis B and C in adult patients visiting Dental Out Patient Department of Mardan Medical Complex, Mardan

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ABSTRACT

Background: Hepatitis is a liver inflammation, most often caused by viral infection. Among these viruses, hepatitis B virus (HBV) and hepatitis C virus (HCV) infections account for a large proportion of liver diseases around the world. HBV and HCV are the main etiological factors of chronic liver disease, which include hepatocyte carcinoma and cirrhosis. **Objectives:** This study aimed to determine the Frequency of HBV and HCV in adult patients visiting the Dental Out Patient Department at Mardan Medical Complex, Mardan. **Method:** This cross-sectional survey was carried out at Mardan Medical Complex (Dental Department), Mardan from February to June 2021. A total of 300 patients of age > 18 years, visited MMC for seeking various dental treatments and dental surgeries. All the patients were tested for Hepatitis B and Hepatitis C virus infections. The immunochromatography technique (ICT) was used to determine the frequency of HBsAg and Anti-HCV in the blood samples of the patients. Observed information was analyzed by using SPSS (Statistical Package for Social Sciences) version 20. **Result:** A total of 300 patients were examined, who meet the inclusion criteria (18-55 years of Age). Out of a total of 300 patients, 133(44.4%) were observed positive for HBV and HCV infections collectively. After screening, 68(22.7%) were detected positive for HBsAg, while the ratio of HCV-positive patients was found positive in 65 (21.7%) cases. The high ratio of HBsAg positivity was found in the age group 25-31year which is 23/93 (7.7%), while Anti-HCV positive ratio was high in the age group 32-38year with percent prevalence in 18/56(6.0%) individuals. The association between spouse patient history and HBsAg, anti-HCV was found significant where (p=0.001) and (P=0.001), respectively. **Conclusion:** A high frequency of Hepatitis B virus and Hepatitis C virus infections in Mardan was an alarming situation. The overall prevalence of HBV recorded in our study was higher than the prevalence of HCV. High prevalence of HBsAg positivity in the case of Spouse Patient History while in the case of Anti-HCV positivity high prevalence was observed in the case of Shaving by Self.

Keywords: Hepatitis B virus (HBV), Hepatitis C virus (HCV), Hepatocellular carcinoma, Prevalence

INTRODUCTION

The term Hepatitis is defined as, “The inflammation of liver tissues”, liver fibrosis, liver cirrhosis and hepatocellular carcinoma (HCC) resulted from a long period of liver inflammation [1]. Hepatitis B virus belongs to “Orthohepadnavirus” genus, which is the active ingredient of “Hepadnaviridae” a viral family [2]. Chronic Hepatitis B virus infection accounts for all-over the world issue, because of its high frequency and the increased chances of leading toward cirrhosis and hepatocellular carcinoma (HCC) [3]. Hepatitis B virus is a double stranded DNA virus having properties like hepatotropic and noncytopathic, leads toward acute and chronic necro-inflammatory liver disease (hepatitis), liver cirrhosis, failure of liver and HCC [4]. The Dentists are the high-risk group in the occurrence of HBV infection. The reported incidence rate of HBsAg among dentists is 0.6% in the USA, 2.4% in Malaysia and 13% in Korea [5].

HBV infection spreads from an HBsAg positive mother through vertical transmission and sexual contacts without protection, intrafamilial transmission has also reported [6]. The high risk of HBV transmission is related to medical and non-medical

procedures including, blood products, whole blood transfusions, surgical and non-surgical procedures, administration of Intravenous drug, accidental puncture by infected needles, accidental contacts with infected blood, tattoo or piercing, different whitening procedures, and manicure or pedicure [7]. Moreover, HBsAg persists for more than six months then it termed to chronic hepatitis B virus infection [8]. Presently, there are two main treatment options for Chronic HBV infection, one is Nucleotide Analogues (NA), and the other is Alpha-interferon (IFN). There is a direct antiviral effect of NA on HBV by blocking DNA polymerase, and it is administered through oral route. IFN and pegylated alpha-interferon peg-IFN) has a low antiviral effect instead of NA treatment [9]. Hepatitis C is a single stranded RNA virus belonged to viral family Flaviviridae. Around 50-80% of patients disposed to ongoing hepatitis C infection disease. Chronic HCV infection causes chronic inflammatory disease processes, eventually lead to liver fibrosis, liver cirrhosis, hepatocellular carcinoma and finally death [10]. Most commonly, HCV infection spread in children through vertical transmission, at least 6% of infants born to women with HCV infection [11]. Most of the infection transmitted through, direct exposure by blood i.e. with injection drug use, parentral exposure to blood via contaminated medical equipment or transfusion of unscreened blood and blood products [12]. Most common hazardous factors include Lack of awareness, Illiteracy, Unsafe blood and transfusion of blood products, organ transplantation, occupational exposure among health-care workers, therapeutic injections, dental treatments, barber shop sharing razors, surgeries performed by unqualified medical professionals under inadequate sterilization practices [13].

The possibility of HCV transmission needs to be investigated because dental practice is often associated with bleeding. At present, few studies have been reported, the overall risk factor of dental care termed as a major threat for HCV transmission. According to the Health Canada in 2016, approved the intake of pangenotypic interferon-free (direct acting) antiviral regimens for treatment of HCV, because they require shorter duration for treatment and have higher likelihood of sustained virologic response [14].

Approximately 13 million people are badly suffered with HBV infection in the World Health Organization (WHO) Eurapean region, which resulted 60,000 deaths per year due to Hepatitis B related liver cancer and liver cirrhosis [15]. As per results of "Sero-prevalence and Biomedical investigation for HBV and HCV infection" in hospital-based patients of Islamabad (2020), the sero-prevalence of hepatitis B virus and Hepatitis C virus were observed to be 2.02% and 8.24%, respectively [16]. Furthermore, Pakistan has the second most Frequencies of HCV (5%) after Egypt and the second highest number of individuals experiencing HCV after China. Commonly the Punjab has the highest cases of hepatitis [17]. From 1999 to 2016 in Brazil country 319,751 cases of hepatitis C were reported with anti-HCV or HCV-RNA reagents [18]. As the infection s of Hep B and Hep C are increases day by day especially in invasive procedures which need to be investigated. Therefore, the aim of this study is to screen out adult dental patients of HBV and HCV infections visiting Out Patient Department for different dental procedures in Mardan Medical Complex (Dental Department), Mardan.

MATERIALS AND METHODS

The study was a cross-sectional based on pre-designed close ended questionnaires administered to adult dental patients visiting outpatient Department of Dental in Mardan. The duration to conduct this study was 4-6 months and the targeted population was 300 adult (18-55) dental patients. The inclusion criteria include adult patients of age between 18-55 (Both genders) with exclusion of teenagers (Below than 18 years) and the old age patients above than 56 years. Permission for this study was granted from MS of MMC, Mardan. The close ended questionnaire was used to collect the data and information from the patients who take part in this study, which reflected the aim of this study. The close ended questions had possible answers out of which the included patients were required to select the appropriate answers accordingly. Written consent was taken from patients to use their data for research purpose and kept it confidentially. Patients were also observed for detection of Hepatitis B and C virus using immunochromatographic technique (ICT) rapid testing. Data was kept confidential and secure.

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 software. SPSS was run for finding general frequencies, cross-tabulation, and Chi-square test of the collected data. The results were then summarized and illustrated in the form of tables and figures. The Ethical consideration approval certificate was taken from Ethical committee of Allied Health Sciences, IQRA National University.

RESULTS

In this cross-sectional survey, a total of 300 patients were tested for the detection of HBV and HCV infections. Among these 167(55.7%) were males and 133(44.3%) were females. The percentage of married participants was 146(48.7%) and un-married participants were 154(51.3%). On screening by ICT 68(22.7%) were found positive and 232(77.3%) were negative for HBsAg

(Table 1). Similarly, in the case of HCV, 65(21.7%) positive and 235(78.3%) negative patients was observed via ICT method (Table 2). According to education level most of the study respondent 39.7% had bachelor education followed by HSSC with 23/7%, SSC with 15.7% while 21% were recognized as an illiterate.

Table 1. Shows the frequency of HBV infections

HBsAg by ICT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	positive	68	22.7	22.7	22.7
	negative	232	77.3	77.3	100.0
	Total	300	100.0	100.0	

Table 2. Shows the frequency of HCV infections

HCV by ICT					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	positive	65	21.7	21.7	21.7
	negative	235	78.3	78.3	100.0
	Total	300	100.0	100.0	

According to age-wise distribution of members infected by HBV and HCV is shown in Table (3 and 4). Majority of HBsAg positive infections was high in age group 25-31year which is 23/93(7.7%) while low in the age gathering of 46-52 which is 3(1.0%). In case of HCV infection, the age group of 32-38 year which is 18/56(6.0%) was mostly affected than the age group of 53-55 HCV positive cases with prevalence rate of 5(1.7%).

Table 3. Shows the age wise distribution of HBV

Age of participants HBsAg by ICT Crosstabulation					
			HBsAg by ICT		Total
			Positive	negative	
Age of participants	18-24	Count	8	73	81
		% of Total	2.70%	24.30%	27.00%
	25-31	Count	23	70	93
		% of Total	7.70%	23.30%	31.00%
	32-38	Count	20	36	56
		% of Total	6.70%	12.00%	18.70%
	39-45	Count	8	24	32
		% of Total	2.70%	8.00%	10.70%
	46-52	Count	3	20	23
		% of Total	1.00%	6.70%	7.70%
	53-55	Count	6	9	15
		% of Total	2.00%	3.00%	5.00%
Total		Count	68	232	300
		% of Total	22.70%	77.30%	100.00%

Table 4. Shows the age wise distribution of HBV

Age of participants HCV by ICT Crosstabulation					
			HCV by ICT		Total
			Positive	negative	
Age of participants	18-24	Count	8	73	81
		% of Total	2.70%	24.30%	27.00%
	25-31	Count	17	76	93
		% of Total	5.70%	25.30%	31.00%
	32-38	Count	18	38	56
		% of Total	6.00%	12.70%	18.70%
	39-45	Count	11	21	32
		% of Total	3.70%	7.00%	10.70%
	46-52	Count	6	17	23
		% of Total	2.00%	5.70%	7.70%
	53-55	Count	5	10	15
		% of Total	1.70%	3.30%	5.00%
Total		Count	65	235	300
		% of Total	21.70%	78.30%	100.00%

Table 5. Shows the frequency of patients with hemodialysis in case of HBV

Crosstabulation					
			HBsAg by ICT		Total
			positive	negative	
Haemodialysis	Yes	Count	18	39	57
		% of Total	6.00%	13.00%	19.00%
	No	Count	50	193	243
		% of Total	16.70%	64.30%	81.00%
Total		Count	68	232	300
		% of Total	22.70%	77.30%	100.00%

Table 6. Shows the frequency of patients with hemodialysis in case of HBV

Crosstabulation					
			HBsAg by ICT		Total
			positive	negative	
Haemodialysis	Yes	Count	18	39	57
		% of Total	6.00%	13.00%	19.00%
	No	Count	50	193	243
		% of Total	16.70%	64.30%	81.00%
Total		Count	68	232	300
		% of Total	22.70%	77.30%	100.00%

In case of Hemodialysis, 57out of 300 individuals had the history of hemodialysis in which 18/57(6.0%) were positive for HBsAg (Table 5), and 17/57(5.7%) were found positive for anti-HCV (Table 6).

Out of 300 participants, 125(41.7%) had the history of piercing nose /ear in which 27/125(9.0%) were positive for HBsAg and 98/125(32.7%) were negative. In case of anti-HCV 26/125(8.7%) were positive and 99/125(33.0%) were found negative for HCV. In case of spouse patient 21(7%) were positive and 11(3.7%) were negative for HBsAg, while anti-HCV was detected positive in 17(5.7%) and while 10(3.3%) were negative. The association between spouse patient history and HBsAg, anti-HCV was found significant where (p=0.001) and (P=0.001), respectively. Out of a total of 170(56.7%) had the history of previous dental procedures, in which 44(14.7%) were found positive for HBsAg and 126(42.0%) were negative. While in case of HCV 43(14.3%) were found positive for anti-HCV while 127(42.3%) were negative. The co-relation between previous dental procedure found insignificant (P=0.128, P=0.081) for HBsAg and HCV respectively. Visiting the barber shop almost 71 did their shave by own in which 19(6.3%) were found positive for HBsAg and 23(7.7%) were positive for anti-HCV, while 99 participants visited barber shop in which 23(7.7%) were positive for HBsAg and 17(5.7%) were positive for anti-HCV, and insignificant association was found between history of shaving and HBsAg while in case of HCV it was significant. Out of 300 participants, 61(20.3%) had the history of jaundice in which 20/61(6.7%) were positive for HBsAg while 25/61(8.3%) for anti-HCV antibodies. The association between jaundice and HBsAg was significant also the relationship between jaundice and HCV was found significant. Out of 300 participants, 160(53.3%) had the history of surgical operation in which 44/160(14.7%) were positive for HBsAg and 44/160(14.7%) in case of anti-HCV antibodies. The association between surgical operation and HBsAg was significant also the association was significant between surgical operation and HCV. Patients with history of intramuscular and intravenous injection showed that out of 300 respondents, 36(12.0%) having the history of intramuscular and intravenous injection were positive for HBsAg while 140(46.7%) were found negative. The chi-square test was applied to find any co-relation between I.M/I.V. Injection history in the case of HBsAg was found insignificant where n=300(1-*P*=0.276). Anti-HCV antibody was found in 30 (10.0%) while 146 (48.7%) of cases were negative in case of HCV infection. The co-relation between I.M/I. V injection history and anti-HCV was found significant where N=300 (1-P=0.021). Participants visited barber shop for shaving purposes was also observed. Out of 300 participants, 71 had shave by own in which 19(6.3%) were found positive for HBsAg and 23(7.7%) were positive for anti-HCV. While 99 participants visited barber shop in which 23 (7.7%) were positive for HBsAg and 17(5.7%) for anti-HCV. History of acupuncture was also noticed in this study. Among 300 participants, 107(35.7%) marked yes in the history of acupuncture in which 26 (8.7%) were found positive for HBsAg and 31(10.3%) were positive for anti-HCV. The co-relation between acupuncture and HBsAg was found insignificant (P>0.2) while in case of HCV it was significant having P-value less than 0.05 and recorded as (*P*= 0.001). In case of intravenous drug user it was observed that 123/300(41.0%) had the history of intravenous drug use in which 41(13.7%) were positive for HBsAg and also 41/123(13.7%) were found positive for anti-HCV. The relationship between intravenous drug usage and HBsAg was significant (P<0.05) and also the co-relation was found significant in case of HCV. According to history of jaundice out of 300 participants, 61(20.3%) had the history of jaundice in which 20/61(6.7%) were positive for HBsAg and 25/61(8.3%) were positive for anti-HCV. The association between jaundice and HBsAg was found significant also the relationship between jaundice and HCV was found significant (P < 0.001). History of surgical operation, out of 300 participants, 160 (53.3%) had the history of surgical operation in which 44/160(14.7%) were positive for HBsAg and 44/160(14.7%) were positive for anti-HCV. When SPSS was run for chi-square test. The association between surgical operation and HBsAg was significant also the relationship between surgical operation and HCV was also found significant.

DISCUSSION

Viral Hepatitis is a contagious viral infection and becomes and worldwide problem. HBV and HVC infections transmitted through many ways such as needle prick with infected person, contaminated syringes as well as the needles through the accidental inoculation during any surgical, dental or any invasive procedures. The current study highlighted the screening of viral hepatitis in patients visiting dental OPD for any type of dental procedures. In the current study, the overall prevalence of HBsAg was found in 22.7% individuals while the ratio of HCV in 21.7% of cases using ICT method. Another study from Pakistan reported the 1.32% HCV infection among the doctor involved in dental procedures [19].

Another study reported HCV infection among doctors with 0% prevalence [20]. As compared to this study, very low level of HBV and HCV infection with 0.60% and 1.43% cases were reported from Tokyo Yaesu Dental Clinic Japan [21]. A previous report from Peshawar, Pakistan reported the HBV and HCV infection in patients visiting dental OPD in Khyber college of dentistry with

incidence rate of 2.14% and 2.98% HBV and HCV infections, respectively [22].

In the current, some of the most associated risk factors was also evaluated, such as piercing of era/nose etc, 9% and 8.7% of HBV and HCV antibodies was notices, respectively. These findings are not similar to the previous report from Peshawar that 1.9% was positive for HBV infections in case of piercing, 1.7% had visiting the barber shop and only one case positive for HBV with hemodialysis. According to previous history of dental procedure only 5.4% were HBV infected [22], same study also reported HBsAg in case of spouse history in which 7% and 28% were positive for HBV and HCV antibodies [22], in our study, 6% individuals were positive for HBV infection in case of hemodialysis, and 14.7% positive for HBV and 14.3% in case of HCV having previous history of dental procedures, while 8 and 28% were found positive for HBsAg and HCV antibodies using ICT method [22].

Our current investigation is not in accordance with another Pakistani study that investigated the associated risk factor and the viral infections. As a study of Pakistani Punjabi patients tested for HBV infections, significant risk factors for HBV transmission such as 23.60% history from barber risk 4.04% from blood transfusion risk, 26.19% had the history of injection, 26.60% reuse of syringes 11.20% dental risk 4.26% cases had surgical procedure risk [23].

Various studies reported different prevalence rate as 3.8% HCV and 2.2% HBV from United Arab Emirates (UAE) [24], 0.5% HCV and 0.6% HBV from Japan [25], 15.2% HBV and 2% HCV amounted from Saudi Arabia [26], 22.9% HBV and 59.8% HCV from Iran [27], and 0.87% to 21.4% HBV and 0.57-53.7% HCV from India [28]. Variation in the prevalence and viral infections and their associated risk factors of the current study in comparison with other reports from various countries might be due to the number of study isolates, duration and year of the study, sexual awareness, safe practices, use of sterilized syringes, avoidance of needle prick and the sterilization of dental equipment's used for various dental procedures. Proper protocol should be adopted about the awareness and the most associated causes involved in the spread of these infections.

CONCLUSION

High prevalence of Hepatitis B and C observed in our study. Overall prevalence of HBV was higher than HCV. High prevalence of HBsAg positivity in case of spouse patient history, history of intravenous and intramuscular injections, history of previous dental procedure, shaving at barber shop, while in case of Anti-HCV positivity high prevalence was observed in case of shaving by self, history of Acupuncture, history of jaundice. Spouse patient history, history of intravenous drug use, history of Jaundice, history of surgical operation was observed as a significant hazardous factor in the transmission of both Hepatitis B and C. Other risk factors like History of I.V/I.M injections, shaving at barber shop and history of Acupuncture were found significant only in case of HCV transmission.

ETHICAL APPROVAL

Ethical approval was granted from ethical committee of Iqra national University Hayatabad, Peshawar.

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CONFLICT OF INTEREST

None to declare.

AUTHOR CONTRIBUTION

Authors from 1-4 as mentioned in Title page of the manuscript collected the data, and write down the manuscript
Usman the 5th Authors contributes the idea for research
Dr. Amir Afzal Khan: Critically analyses the data and proof reading of the manuscript
Asad Ali: Done all the statistical Analysis

AVAILABILITY OF DATA AND MATERIALS

N/A

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None to declare.

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