



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 8, Issue, 02, pp.26834-26838 February, 2016

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

RESEARCH ARTICLE

EVALUATION OF HEPATITIS B AND C RELATED IN ORAL HEALTH: A POPULATION-BASED, STUDY IN KARACHI PAKISTAN

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ARTICLE INFO

Article History:

Received 27th November, 2015

Received in revised form

25th December, 2015

Accepted 11th January, 2016

Published online 27th February, 2016

Key words:

Hepatitis B virus (HBV),
Hepatitis C virus (HCV),
Dental treatment-Risk factor,
Blood transfusion.

ABSTRACT

Background: At the beginning of the third millennium, hepatitis B virus (HBV) or hepatitis C (HCV) remains a major public health problem globally; more than two billion people have been infected worldwide, and of these, 350-400 million suffer from chronic infection. Patients chronically infected either with hepatitis B (HBV) or hepatitis C virus (HCV) are at increased risk of developing cirrhosis, end stage liver disease and hepatocellular carcinoma. Different risk factors were found to be associated with the transmission of these viruses in various settings. HBV and HCV transmission seems to be also acquired by non-parenteral and non-sexual routes. A large number of patients infected with HCV might have non identifiable routes of viral acquisition. Hence, viral hepatitis transmission risk factors identification is the main way to reduce infection. Dental treatment may be one of such risk factors.

Materials and Methods: A total of 496 samples were collected with the history form. The blood samples were collected from individual and was tested for hepatitis B surface antigen and for hepatitis C virus antibodies by ELISA.

Results: After the selection criteria we evaluated that besides all-time risk of HBV and HCV infection, the dental clinic is at high risk where the rate of hepatitis infected individuals is higher.

Conclusion: Dental treatment can be included among the risk factors of HBV and HCV infection. This risk can easily be eliminated using standard precautionary measures.

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Citation: Erum Afaq, Nazia Jameel, Saara Ahmad, Rubina Ghani and Anna A. Abbasi, 2016. "Evaluation of hepatitis b and c related in oral health: a population-based, study in Karachi Pakistan", *International Journal of Current Research*, 8, (02), 26834-26838.

INTRODUCTION

At the beginning of the third millennium, hepatitis B virus (HBV) remains a major public health problem globally; more than two billion people have been infected worldwide, and of these, 350-400 million suffer from chronic infection (Marcellin et al., 2009; Luksamijarulkul et al., 2011). According to WHO figures, worldwide, about 2 billion people have been infected with HBV, 240 million have a chronic infection, and about 600,000 die every year due to its consequences (Hepatitis, 2013).

Similarly, around 3-4 million people are infected with HCV annually, 150 million have a chronic infection, and around 350,000 die due to the liver related diseases caused by it (Hepatitis, 2014). HBV and HCV are the leading causes of hepatocellular carcinoma and cirrhosis related end stage liver disease (Ali et al., 2011). Pakistan, ranking 146th on the Human Developmental Index (World Health Organization, 2000) happens to be one of the most seriously afflicted countries. Unfortunately due to a limited number of studies, the prevalence for HBV at the National level is not available (Aziz et al., 2010), however according to WHO, Pakistan has one of the highest rates of chronic HCV infections (4.8%) (Hepatitis, 2013). Many studies have been done on the prevalence and risk factors of HBV and HCV, in various areas of the four provinces in order to gauge the situation across the

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country. For instance a study done in the villages of Taluka Tharo Shah and Jalabani District Nausheroferoz in Sindh, showed that 7 % of the subjects were HbsAg positive and 28.6% were Anti Hcv reactive (Khan et al., 2011). Similarly a study done in Punjab to check for HBV DNA in patients suffering from Chronic Liver Disease, using Real Time PCR, showed that out of 4890 patients, 3143 were positive for HBV (Ghani et al., 2013). A vaccine for HBV was developed in the year 1982 and more than 1 billion doses have been used world over (Hepatitis, 2013). This has definitely reduced the burden however we are still far from global eradication. There is no known vaccine for HCV to date (Hepatitis, 2013). Hence it makes sense to perform studies on the various risk factors of HBV and HCV in order to make people aware of these diseases, their risk factors and the various routes of transmission in order to stop the problem at its source. The aim of this study was to learn about the different risk factors predisposing the residents in different areas of catchment center in Gadap Town, Karachi, Pakistan, to HBV and HCV.

MATERIALS AND METHODS

Geographical division

The study was conducted between the months of October 2011 and May 2012. Blood samples were collected from 4 centers of catchment area near Baqai Medical University. These 4 centers were further subdivided into smaller towns or 'Goths'. The first center, Konkar area was divided into 9 towns; Faqir Sohrab Goth, Khamso Goth, Harbil Goth, Kuto Khan Goth, Moulvi Goth, Hindu Goth, Meva Goth, Sher Mohammad Goth and Ahmed Goth. A total area of 17 kilometers square was covered and a total of 1821 residents were found to reside in that area. The second center, C/M Sain Rakhio Goth, was subdivided into 6 towns; Kadho Goth, Mangio Goth, Rozi Gonder Goth, Bachal Murred Goth, Ganwar Goth and Allah Bachayo Goth. Over here an area of 10 kilometers square was covered with population coverage of 2649. The third area covered was Radho Jokio Goth and this was subdivided into the following 7 towns: Dost Mohd Goth, Mulla Arzi Bagh, Ishaq Bagh, Sher Muhammad Bagh, M. Abdul Hakeem Goth, Kadho Goth and Murreed Goth. The area covered was 14 Kilometer square having total population of 2577. The fourth catchment center was Haji Karim Goth which was sub-divided into Doda Goth, Pir Buksh Goth, Faiz Muhammad Goth, Nazar Muhammad Goth, Baksh Ali Goth, Rahim Bakhs Goth, Wahid Bux Goth and Aleem Adil Bagh. The area covered was 7 Kilometer square having a population of 847 people (Ghani et al., 2013).

Specimen collected

The sample consisted of 496 subjects coming from 472 familial clusters. Out of these 396 (79.8%) were females, age range 11-60 years, median age 28 years and 52 (10.4%) were males with age range 22-60 years and the median age being 30 years. All the blood samples were collected along with the history forms. All samples were then centrifuged within two hours of vein puncture. Sera were frozen till the analysis (Aziz et al., 2010 and Ghani et al., 2013).

Risk factors considered

During sample collection, history form was filled by each patients. Each form was study and all the risk factors were identified individually and it was found out that there were major 6 risk factors which were taken into account: dental treatment, blood transfusions, shaving at the barber's shop (this one being specific to men), use of the injections, tattoos and the delivery of a baby at home.

Serological markers used

The serum was tested for Hepatitis B surface antigen (HB s Ag) by ELISA and Hepatitis C virus antibodies (HCV Ab) by third generation ELISA. All the samples were evaluated by Monolisa HB s Ag ULTRA, and Monolisa HCV Ag-Ab ULTRA, respectively (Bio-Rad Laboratories, CA, USA) (Aziz, 2010; Khan et al., 2011; Ghani et al., 2013 and Hennig et al., 2000). All the positive cases of HBV and HCV were saved at -80° C for further analysis by PCR for the identification of the carrier state or for the treatment.

RESULTS

Detailed history showed that all the patients belonged to the Sindhi ethnic group. 65% of the sample population was illiterate (Ghani et al., 2013) 38 people (7.66%) had received the hepatitis B vaccine. 15.9 % of the specimen were positive for HBsAg, 31.8% were positive for HCV Ab, and 5.2% was positive for both as shown in the following Table 1, 2 & 3.

Table 1. Shows Active HB s Ag infection in ELISA Positive Male & Female patients (n=496)

Sex	No. of Samples	Positive	Percentage
Male	124	41	33.06
Female	372	38	9.94
Total	496	79	15.92

Table 2. Shows Active anti HCV infection by ELISA Positive in Male & Female patients (n=496)

Sex	No. of Samples	Positive	Percentage
Male	124	55	44.35
Female	372	103	20.76
Total	496	158	31.85

Table 3. Shows Active HB s Ag anti HCV infection by ELISA Positive in Male & Female patients (n=496)

Sex	No. of Samples	Positive	Percentage
Male	124	8	6.45
Female	372	18	4.71
Total	496	26	5.24

Male to female ratio for HBsAg was 1.08:1, for HCV Ab was 0.53:1 and for both was 0.44:1. Starting with the risk factors, 34.2% of the infected population had a positive history of previous dental treatment, 15.6% had a history of blood transfusions, 10.3% had a history of shaving at the barber's shop, 23.6% had a history of using injections, 7.6% had tattoos and 8.7% had a history of delivering babies at home as shown in Table 4.

Table 4. Shows the Risk Factors for infection with HBV and HCV

Sex	Dental Treatment	Blood Transfusions	Shaving at Barbers	Injections	Tattoos	Delivery at Home	Total
Male	38	13	27	23	3	0	104
Female	52	28	0	39	17	23	159
Total	90	41	27	62	20	23	263

DISCUSSION

A big part of viral hepatitis affected patients are infected with either HBV or HCV (Te *et al.*, 2010; Nima Mahboobi *et al.*, 2013). Identification of a large number of patients with an unknown route of viral hepatitis transmission suggests other possible transmission modes. Few studies have been done on the prevalence and risk factors of HBV and HCV in Pakistan and all around the world. The most important risk factor in our study was dental treatments, followed by blood transfusions being the second most common factor and reused injections being the third. The issue of viral hepatitis infection in dentistry is an important one (Mahboobi *et al.*, 2010; Gillcris *et al.*, 1999). To date there has been no definite conclusion on the role of dental treatment in viral hepatitis transmission; whether from patient to patient, dentist to patient or vice versa. While evaluating the studies, available data were so limited for many papers, differences in the assessed papers also prevented us from reaching a specific conclusion. For example, the results of papers might be influenced by the origin of the studies. Reports that addressed dental treatment as a risk factor for viral hepatitis infection were mostly from Middle East, Africa and Eastern Europe, possibly due to non-adherence to guidelines on infection control in those regions, and probably through the use of non-disposable or reusable syringes and the lack of sufficient sterilization technology, whereas studies in the US, Western Europe and Australia generally have not reported any association between medical or dental procedures and viral hepatitis infection (Kerzman *et al.*, 2007).

Different dental procedures (e.g. tooth extraction, gum surgery or root canal therapy) were evaluated in different studies. More seriously, some others assessed treatments performed by an uncertified person. Additionally, different types of analyses (such as descriptive or multivariate/univariate analytic) were used to evaluate the roles of HBV and HCV risk factors. So, all the findings could not be added together to reach a specific answer on the defined question. Interestingly, in some studies despite initial results showing an association between viral hepatitis and dental treatment, when further analysis applied it was identified that such results might be influenced by the time of the operation or participants' age. When compared to other studies held in different countries, the risk factors in Pakistan vary slightly. For instance in Pakistan reused syringes (therapeutic injections and otherwise), blood transfusions, dental treatments, surgical procedures, shaving at the barbers shop, and tattooing happen to be the most common causes for transmission (Weber *et al.*, 2006; Hwang *et al.*, 2006; Mahboobi *et al.*, 2013 and Baha *et al.*, 2013). However according to a study done in Morocco, some of the important risk factors identified for HCV are age, dental treatment, use of glass syringes, and surgical history, and for HBV are gender and sexual risk behavior (Sheikh *et al.*, 2011).

Even though a slight variation in the order of importance exists, some factors are common across the globe. Intravenous drug use, unprotected sexual contact with multiple partners, viral exposure during medical procedures such as dialysis and surgery, accidental exposure such as needle stick injuries and vertical transmission from mother to child are the common routes of infection with both HBV and HCV (Te *et al.*, 2010). Interestingly, it has been demonstrated that both HBV and HCV can be transmitted via saliva and gingival cervical fluid. According to this research, there is a major risk of HBV and HCV infection during dental treatment. This correlation has been appreciated in other studies as well; however it is more important in developing countries like Pakistan where incidence of HBV and HCV is higher. This risk can be eliminated by the enforcement of correct precautionary measures (Te *et al.*, 2010).

Blood transfusions are one of the major risk factors for HBV and HCV, especially for HCV (Sheikh *et al.*, 2011) since it requires a high viral load. According to this study it was the second most common risk factor, right behind dental treatments. This is another risk factor which can be controlled by enforcing the correct precautionary measures. Reuse of syringes, as mentioned earlier, is major risk factor. In Pakistan a large proportion of the population prefers injections over oral medication (Baha *et al.*, 2013). There is a general misconception amongst the uneducated that leads them to believe that getting injected with medication makes them better. This makes it easy for the 'quacks' practicing to administer simple saline. The injections they use are mostly reused. According to a study conducted previously, most of the syringes used in the healthcare system are simply dumped into general waste, which places a great threat on the people sifting through it (Hwang *et al.*, 2006). Shaving at the barber's shop happens to be an important risk factor as demonstrated by this study.

Unfortunately there is a portion of the barber population not aware about hepatitis being a disease that can be transmitted through reusing unclean razors (Ali *et al.*, 2011; Hwang *et al.*, 2006 and Mahboobi *et al.*, 2013). Many of them are not careful about the hygiene practices such as changing their aprons and towels or washing their hands (Sheikh *et al.*, 2011). Vaccinating only high risk individuals in order to protect the entire community has not worked in the past (Jokhio *et al.*, 2010). Therefore greater measures have been taken in order to head towards eradication. The HBV vaccine has been included in the EPI schedule since 2002 and healthcare providers in the public sector are eligible for free vaccination (Qureshi *et al.*, 2009). Even after this incorporation, the burden is extremely high in Pakistan due to a lack of adequate health facilities and awareness about the transmission of HBV and HCV. Certain measures can be taken in order to improve the situation. Preventive measures should include routine blood screening

before transfusions (Usman *et al.*, 2003), screening of patients before surgery (Waheed *et al.*, 2009), proper sterilization of dental and surgical equipment, creating awareness and discouraging people from tattoos and delivering babies in unsterile conditions at home, creating awareness amongst barbers about the prevalence, spread and consequences of HBV and HCV, vaccination against HBV, educating and creating awareness about safe sex, and ensuring the proper disposal of used syringes (Butt *et al.*, 2003). In preparing this paper, we noted that available reports are mostly from developing countries, as this risk has been reduced remarkably in developed countries with adequate precautionary measures. The quality of the studies reviewed was not good generally and in a large number of them, statistical data was not available, especially among those which did not find a significant between dental treatment and infection with HBV and HCV. The results in the tables mostly suggest dental treatment as a risk factor. There is therefore a need for more studies on this subject, properly planned, controlled and analyzed. If possible, prospective cohort studies evaluating dental treatment as a risk factor for viral hepatitis transmission are also recommended. Prevention is better than cure. Therefore it is important to dig deeper and conduct more research to get the HBV and HCV prevalence rate along with the emerging risk factors within Pakistan then only one can eradicated and reduce the burden of these diseases.

Conclusion

In these studies it has been concluded that the dental treatment is found to be at high risk. Although most studies have not found dental treatment to be a risk for HBV and HCV, there is evidence that it may pose a risk (He *et al.*, 2011). Despite the importance of the subject, to our knowledge no previous article has reviewed the association of dental treatment with viral hepatitis infection. Considering the results of the studies enrolled in this review, it should be highlighted that although weak, there is an all-time risk of HBV and HCV infection during dental treatment. This is more important in developing countries where the rate of hepatitis infected individuals is higher. In addition, in such countries economic limitations might affect adhering infection precautionary methods by the clinicians and cultural issues might cause patients to conceal their infection. Hence, it is safe to mention the following recommendation for viral hepatitis prevention in a dental setting: 1. effort on increasing the level of knowledge in the general population as well as Dentists and dental health care workers (DHCWs) regarding the infection risk of dental treatment by holding workshops and programs together with media; 2. Preventing unqualified dentists practicing in certain parts of the world and/or making them use infection prevention systems; 3. Monitoring hospitals' infection control systems; 4. Universal use of efficient prevention tools such as HBV vaccine; 5. Checking infection status of DHCWs and considering special strategies for the infected ones

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