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SCREENING FOR HEPATITIS B AND C VIRAL INFECTIONS AMONG PREGNANT WOMEN ATTENDING THE BOLAN MEDICAL COMPLEX HOSPITAL AND SANDEMAN PROVINCIAL CIVIL HOSPITAL QUETTA, PAKISTAN.

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ABSTRACT: Infectious diseases caused by hepatitis B virus (HBV) and hepatitis C virus (HCV) are a worldwide burden to health, especially in developing countries. Pakistan has one of the highest levels of HBV and HCV infection, causing a severe health problem with significant challenges and priorities. To prevent vertical transmission of infection, regular screening of pregnant women for HBV and HCV is vital. **Objectives:** The objective of this study was to evaluate the prevalence of HBV and HCV virus in pregnant women having prenatal care. **Study Design:** Cross-Sectional study. **Setting:** Bolan Medical Complex Hospital and Sandeman Provincial Civil Hospital Quetta. **Period:** August 2017 to July 2018. **Material & Methods:** Blood serum samples were screened for HBV surface antigen (HBsAg) and for anti-HCV using immunochromatography methods. **Results:** A total of 12,209 pregnant women were tested over a period of one year (August 2017 to July 2018). The overall HBV infections frequency was 1.3% (95% CI 1.1-1.4%) and for HCV infections it was 0.6% (95% CI 0.6-0.7%). Whilst there was only small month-wise variation in the occurrence of HBV and HCV infections, HBV prevalence was highest in May (1.7%) and HCV prevalence was highest in August and December (0.8%). **Conclusions:** Screening of all pregnant women for HBV and HCV is essential for reducing and eliminating vertical transmission of infection. Risk factors for infection need to be avoided and managed properly.

Key words: Hepatitis B, Hepatitis C, Infection, Quetta, Screening, Vertical Transmission.

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INTRODUCTION

Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are a worldwide burden to public health.[1-3] Infected people have an increased risk of developing potentially life-threatening hepatic diseases such as cirrhosis, hepatocellular carcinoma (HCC) and liver decompensation. HBV and HCV infections are the principal cause of liver-related deaths[4], with co-infection boosting the severity of hepatic ailment and enhancing risk for progression to HCC.[5] According to the World Health Organization, 887,000 deaths in 2015 were caused by HBV and approximately 399,000 deaths per year are caused by HCV. The 2016 global prevalence of HBV was estimated to be 3.9% (95% CI 3.4-4.6%), corresponding to 292.0 million (251.5-341.1) infections[6], and the 2015 worldwide occurrence of HCV was estimated to be 1.0% (95% CI 0·8-1·1%), corresponding to 71.1 million (62·5-79·4) infections.[7]

HBV and HCV illnesses are most prevalent in developing countries[8,9], the highest being in countries of northern and eastern Africa and southern Asia.[10-12] As an illustration, overall HCV prevalence was measured at 1.7% in the USA[13] and 0.9% in Western Europe.[14] A systematic review for the EU/EEA covering 2005 to 2015 estimated an overall HBV occurrence of 0.9% (95% CI 0.7-1.2%) and an overall HCV occurrence of 1.1%

(95% CI 0.9-1.4%).[15] Overall HCV prevalence in Africa ranges from 0.1% to 17.5%, depending on the territory, the highest being in the countries of Burundi (11.3%), Cameroon (13.8%) and Egypt (17.5%).[16] In Pakistan, HBV and HCV infection is a severe health problem with significant challenges and priorities.[17] Indeed, the general occurrence of hepatitis B surface antigen (HBsAg) is 2.5% and the overall prevalence of anti-HCV is 4.8%, reflecting a combined infection rate of 7.6%, and it is expected that 12 million inhabitants in Pakistan are affected by HBV and HCV.[18] There is considerable variation in infection rates in different regions of Pakistan and in other different settings, however.[19] For tackling the growing HBV pandemic and HCV epidemic in Pakistan, the government launched the National Hepatitis Strategic Framework (NHSF) in October 2017 (http://phrc.org.pk/Extra/NHSF.pdf), and there is an ambitious target to eradicate hepatitis from Pakistan by the year 2030.[20]

In Pakistan, transmission of HBV and HCV is predominantly driven through recycling or insufficient sterilization of medical instrumentation (especially syringes and needles) in healthcare settings, transfusion of unscreened blood and blood products, sharing of injection equipment by drug users, occupational risks (healthcare workers, sex workers, barbers) and household contacts/spousal transmission.[21,22] The transmission of viruses from an infected mother to a child during pregnancy and birth is known as vertical transmission.[23-28] Without treatment the overall risk of HBV vertical transmission is approximately 40%, and up to 90% if the mother has high blood levels of HBV.[29] There is an increased risk of HBV transmission if infection develops during the third trimester of pregnancy, but provision of antiviral therapy in third trimester can reduce perinatal transmission effectively.[30] For preventing vertical transmission of HBV, eight therapeutic agents are approved by the Food and Drug Administration (FDA): standard interferon-alpha, pegylated interferon-alpha and six the oral nucleoside analogues lamivudine, adefovir, telbivudine, tenofovir disoproxil fumarate (TDF), entecavir and tenofovir alafenamide (TAF). The most recently approved is TAF (November 2016), which is a prodrug of tenofovir.[31] Approximately 5% of pregnant women infected with HCV will pass it to their child[32] and the various risk factors for vertical transmission include viral load, HIV status and mode of delivery.[33] Regular screening of pregnant women for HBV and HCV is therefore essential for successful prevention and control of vertical transmission, especially because infection sometimes causes no signs or symptoms.

In order to contribute to the pattern of prevalence for HBV and HCV infections in Pakistan, the objective of this study was to screen pregnant women attending prenatal care at the Bolan Medical Complex (BMC) Hospital and Sandeman Provincial Civil (SPC) Hospital Quetta.

MATERIAL & METHODS

This cross-sectional study was performed over the period of August 2017 to July 2018 at the BMC Hospital and SPC Hospital Quetta. With a population of over one million, Quetta is the provincial capital and largest city in the Balochistan region of Pakistan. The BMC Hospital and SPC Hospital Quetta serve the wider Quetta District, which has a population of over two million. Our study used a total of 12,209 subjects, all of which were pregnant women aged 20 to 40 years attending prenatal care at the hospital. The history of all study subjects was recorded on a specially designed form approved by the ethical review committees of both hospitals. From all patients informed written permission was taken and appropriate confidentiality was kept throughout the study.

The study and all experiments were approved and examined by the ethical review committees of both hospitals.

Blood samples with a volume of approximately 5 ml were collected in a gel tube from 12,209 pregnant women aged 20 to 40 years attending prenatal care at the BMC Hospital and SPC Hospital Quetta. Samples were transported immediately to a laboratory at the BMC hospital, and then centrifuged at 2000 rpm for 5-10 minutes to get a clear serum supernatant. Prior to serologic testing for HBV and HCV, sera were

stored at -20 °C.

Serum samples were screened for HBV and HCV infection using immunochromatographic methods that test for HBV surface antigen (HBsAg) and for anti-HCV, respectively. Screening for HBV used an SD Biolinetest kit (Abbott, UK) containing a membrane strip pre-coated with mouse monoclonal anti-HbS capture antibody on the band region and was used according to the manufacturer's instructions. Screening for HCV used an SD Biolinetest kit (Abbott, UK) containing a membrane strip pre-coated with recombinant HCV captured antigen on the test band region and was used according to the manufacturer's instructions.

The month-wise prevalence of HBV and HCV infection in subjects was measured with numbers of positive cases converted to percentage values. The total annual numbers of positive cases were calculated and the total infection rates were tested with 95% confidence intervals based on the monthly rates.

RESULTS

From a total of 12,209 pregnant women aged 20 to 40 years tested over a period of one year (August 2017 to July 2018), the overall occurrence of HBV and HCV infections were 1.3% (95% CI 1.1-1.4%) and 0.6% (95% CI 0.6-0.7%), respectively (Table-I). Whilst there was only small month-wise variation in the prevalence of HBV and HCV infections, HBV prevalence was highest in May (1.7%) and HCV prevalence was highest in August and December (0.8%). The lowest prevalence of HBV (0.8%) and HCV (0.3%) infections were both detected in February (Table-I).

DISCUSSION

The relatively high levels of HBV and HCV infection in Pakistan are causing a severe health problem with significant challenges and priorities.

Month	No. of Subjects	HBV (HBsAg)		HCV (Anti-HCV)	
		Positive	Negative	Positive	Negative
August 2017	785	8 (1.0%)	777	6 (0.8%)	779
September 2017	1067	15 (1.4%)	1052	6 (0.6%)	1061
October 2017	1280	21 (1.6%)	1259	9 (0.7%)	1271
November 2017	1190	13 (1.1%)	1177	8 (0.7%)	1182
December 2017	1066	15 (1.4%)	1051	8 (0.8%)	1058
January 2018	875	11 (1.3%)	864	6 (0.7%)	869
February 2018	909	7 (0.8%)	902	3 (0.3%)	906
March 2018	1136	13 (1.1%)	1123	6 (0.5%)	1130
April 2018	1148	15 (1.3%)	1133	8 (0.7%)	1140
May 2018	1040	18 (1.7%)	1022	6 (0.6%)	1034
June 2018	897	10 (1.1%)	887	5 (0.6%)	892
July 2018	816	12 (1.5%)	804	5 (0.6%)	811
Total	12209	158 (1.3%) (*1.1-1.4%)	12051	76 (0.6%) (*0.6-0.7%)	12133

Table-I. Month-wise prevalence of HBV and HCV infection among pregnant women attending the Bolan Medical Complex Hospital and Sandeman Provincial Civil Hospital Quetta, Pakistan.
***95% confidence interval**

This means that regular screening of pregnant women for HBV and HCV is necessary to prevent vertical transmission. From our study of pregnant women attending prenatal care at the BMC Hospital and SPC Hospital Quetta, the overall rates of HBV infection (1.3%) and HCV infection (0.6%) were substantially lower than those for the whole country of Pakistan (2.5% and 4.8%, respectfully). By comparison with overall infection rates in developed versus developing countries, this may reflect that our screening was performed in a more developed part of Pakistan and/or using subjects with lower risk factors for transmission of HBV and HCV, although we do not have direct evidence for this. In our study subjects, HBV and HCV infection was prevalent throughout the year with only small month-wise variation.

In a similar study among 10,288 pregnant women in the Peshawar District of Pakistan performed during July 2013 to April 2014, the overall occurrence of HBV was 1.16% (0.96-1.37%) and the overall occurrence of HCV was 1.42% (1.24-1.70%). HBV prevalence was highest in January 2014 (1.69%) and HCV prevalence was highest in March 2014 (2.22%).[34] The overall values from this study are not greatly different to those from our present study. There is large variation in the occurrence of HBV and HCV infection among expecting women from different regions of Pakistan and from different countries, however.

In the Pakistan city of Karachi, 2,592 pregnant women at Zainab Panjwani Memorial Hospital had HBV and HCV prevalence's of 0.34% and 0.69%, respectively.[35] At the Trust Hospital (January to September 2012), 2% of pregnant women were reactive for HBV and 13.3% were reactive for HCV.[36] Also in Karachi, 300 pregnant women at Al-Tibri Medical College and Hospital tested over a period of 3 months had a HCV prevalence of 6.6%.[37] Elsewhere in Pakistan, at Liaquat University Hospital Hyderabad (January to December 2010) the seroprevalence of HCV infection among pregnant women was 4.7%. This study demonstrated that HCV seropositive pregnant women were more likely to have a history of surgery, therapeutic injection use, blood transfusion and sharing of household items.[38] In the Khyber Pakhtunkhwa region, randomly screened hospital-visiting pregnant women had an HCV infection rate of 5.9%, making this province a hotspot of HCV infection in Pakistan.[39]

In other countries, a study of 272 pregnant women and their offspring in Southwestern Nigeria tertiary medical centre, revealed that 9.2% of subjects and 1.1% of offspring were positive for anti-HCV antibodies, reflecting a vertical transmission rate of 12.0%.[40] At an antenatal clinic in India, 8,130 pregnant women had an HCV infection rate of 1.03%.[41] From a study among 400 pregnant women at the Al-Thawra hospital in Sana'a, Yemen, the prevalence of HBV was 10.8% (8.0-14.0%) and prevalence of HCV was 8.5% (6.0-11.5%).[42] Among 360 pregnant women at the Yaounde Central Hospital in Cameroon (January to June 2016) the prevalence of HBV and HCV infection was 9.4% and 1.7%, respectively.[43] Recent systematic reviews of HBV infection among pregnant women in Ethiopia, Iran and Romania revealed an overall prevalence of 4.7% (95% CI 4.0-5.4%)[44], 1.18% (95% CI 0.09-1.53%)[45] and 5.1%[46], respectively.

CONCLUSIONS

In pregnant women attending prenatal care at the BMC Hospital and SPC Hospital Quetta, the overall prevalence of HBV infection was 1.3% (1.1-1.4%) and the overall prevalence of HCV infection was 0.6% (0.6-0.7%). HBV prevalence was highest in May (1.7%) and HCV prevalence was highest in August and December (0.8%). There is large variation in the prevalence of HBV and HCV infection in pregnant women from different regions of Pakistan and in other countries. In order to reduce and eventually eliminate vertical transmission in Pakistan, it is essential that all pregnant women are screened for HBV and HCV infections. It is also important that risk factors for infection are avoided and managed properly. This will require higher standards for sterilization and use of medical equipment, improved healthcare procedures and better education of health professionals and the wider population in Pakistan.

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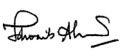
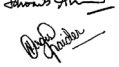
2	Irshad Ahmad	Conceptualized the research and wrote the manuscript.	
3	M. Shahid Javed	Data analysis.	
4	Shoaib Ahmad Malik	Analyzed the data and critically reviewed the manuscript.	
5	Nargis Haider Kakar	Performed the experiments.	
6	Mushtaq Ahmad	Data analysis and review the literature.	
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