(1.37%) in 2002 and 2003 but increased significantly (2.88%) in 2007. This may be due to the fact that HBV is undetectable in the convalescent phase, asymptomatic carriers and window period. Bhattacharya *et al.* (2007) reported that of 21,9746 units collected from blood donors, 1.28% was found to be positive for HBV infections. In the above study a significant increase in all blood born infections was observed in the year 2005 as compared to 2004.[6]

The prevalence of HCV in blood donors of various countries such as UK and USA ranges from 0.01–0.55%.[7] In India, the seroprevalence of HCV in blood donors ranges from 0.12–4%.[2] In our study, the seroprevalence of HCV infection among blood donors was 0.85% and increased significantly from 0.60% in 2001 to 1.33% in 2003. There was a decline to 1.21% in 2004. The incidence again increased from 2005 (0.54%) to 2007 (0.96%). Thakral *et al.* 2006 reported the overall seropositivity of HCV infections to be 0.44% in 16,250 blood units.[8]

The seroprevalence of HIV infection among blood donors in our study was 0.23% and it increased significantly over the study period from 0.12% in year 2004 to 0.26% in year 2006 but declined to 0.17% in 2007. In 2005 Singh *et al.* reported the HIV seropositivity of 0.54% in blood donors of New Delhi.[9] The seropositivity for VDRL was significantly low (0.01%).

This study showed that HBV (1.96%), HCV (0.85%), HIV (0.23%) and syphilis (0.01%) infections were more commonly seen in replacement donors than in voluntary donors. Gupta *et al.* in 2006 also reported that over a period of four years, the prevalence rate of HBV was less among voluntary blood donors. The seropositivity for anti-HCV showed steady decline among voluntary blood donors but increased in replacement donors; the seropositivity of HIV decreased in both the voluntary and replacement blood donors.[10]

To conclude, our study reports on the prevalence of transfusion transmitted diseases in replacement and voluntary blood donors of India. According to this study HBsAg, HCV and HIV infections are still present in almost the same proportion in the population as they were seven years previously.

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The frequency of hepatitis D virus in patients with hepatitis B in Iran: an increasing rate?

Mohammad H Somi MD*
Sara Farhang MD*
Seyyed Mohammad Miri MD*
Ali A Pouri MD* Golnar Mjidi MD*
Seyyed Moayed Alavian MD†

*Liver and Gastrointestinal Diseases Research Center, Tabriz University of Medical Sciences, Tabriz; †Research Center for Gastroenterology and Liver Diseases, Baqiyatallah University of Medical Sciences, Tehran, Iran

Correspondence to: Dr Sara Farhang, Liver and Gastrointestinal Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
Email: dsfarhang@gmail.com

TROPICAL DOCTOR 2009; **39**: 154–156
DOI: 10.1258/td.2009.080365

SUMMARY This study sought to determine the seroprevalence of the hepatitis D virus (HDV), the risk factors and its association with the severity of liver disease. Continuous patients at Tabriz and Tehran Hepatitis Clinics were enrolled during 2007–2008 in a cross-sectional study. Demographic data and possible risk factors for infection were recorded for all hepatitis B surface antigen positive patients. The blood samples of 847 patients infected with the hepatitis B virus were evaluated. The seroprevalence of HDV was 9.3%. This rate was significantly higher after reaching 40 years of age. The rate was 12.7% in patients with chronic hepatitis B and 4.7% in patients with in-active hepatitis B; the difference was statistically significant. A history of dental interventions and several trips abroad were good predictors of HDV infection in logistic regression. No significant difference in liver function tests was found. The seroprevalence of HDV was higher than in

some other studies from Iran but a decrease was noted in younger age.

Introduction

The hepatitis D virus (HDV) was diagnosed in 1977 in patients with a more severe hepatitis B virus (HBV) infection. The chronicity following co-infection of HBV and HDV is associated with an increased risk of cirrhosis and hepatocellular carcinoma.[1]

HDV infection has a worldwide but heterogeneous distribution. It is endemic in Middle Eastern countries but epidemiologic studies in Central Asian countries are limited. The prevalence of HDV infection in patients with chronic liver disease is reported to be as low as 2% in Yemen[2] and up to 32.7% in Turkey.[3] In Iran, this rate varies from 2.4% in blood donors to 10 % in patients with chronic liver disease.[4–5]

The incidence and prevalence data are restricted due to inaccurate reporting and delayed detection. Despite the reported decline in the prevalence of both acute and chronic HDV infection in Southern Europe and Southeast Asia, a slow trend of increase has been obvious in studies from Iran over the years. Therefore, this multi-centre study was carried out in order to determine the seroprevalence of the HDV virus among a large sample of patients infected with HBV and to estimate the risk factors in Iran.

Materials and methods

A cross-sectional study was performed in two referral centres for liver diseases in Iran during 2007–2008. Research centres for liver and gastrointestinal diseases in the Tabriz and Baqiyatallah Medical Universities (in the northwest and the centre of Iran, respectively) register most of the patients with liver disease, including patients with various ethnic backgrounds such as Turkish, Kurdish and Fars patients. Socio-demographic data and potential risk factors were obtained by using a standardized questionnaire. The data of all patients were divided to 'patients with chronic hepatitis' and 'inactive carriers' by ultrasonography and/or histopathology and liver function tests.

Serum samples were collected from a total of 847 patients with chronic liver disease (mean age $\pm$ standard deviation: 38.9 $\pm$ 14.6 years) including those with chronic hepatitis or cirrhosis ($n = 547$) and inactive carriers ($n = 300$). Patients infected with the hepatitis C virus, with alcohol-induced liver disease or evidence of non-alcoholic steatohepatitis and on medication were excluded.

All serological tests were performed as instructed by the manufacturers (ELISA kit, DiaSorin, Italy, for the viral markers and Pars Amzoun, Iran, for the liver function tests).

Fisher's exact, chi-square and the Student's *t*-test were used where appropriate. To assess the independent predictive role of the risk factors, multiple logistic regressions were carried out. $P < 0.05$ was considered statistically significant.

Results

Among the study population, patients with chronic hepatitis or cirrhosis (39.9 $\pm$ 15.3 years) were significantly older than inactive carriers (37.3 $\pm$ 13.1, $P = 0.012$).

Anti-HDV antibodies were detected in the serum samples of 79 patients: a prevalence rate of 9.3% for HDV/HBV infection was noted, predominantly in patients at the Tabriz Hepatitis Clinic (13.2% versus 7.7%, $P = 0.012$). This rate was significantly higher among patients with chronic hepatitis (12.7%) compared to inactive carriers (4.7%), but not statistically different between men and women. The examinations representing the function of the liver in the two groups (inactive and chronic hepatitis B) are described in Table 1. Despite patients having liver disease, the rate of HDV infection was significantly higher in those over 40 year of age ($P = 0.025$). It was 5% under 30 years, 7.2% in the third decade, 13.1% in the fourth decade, 13.7% in the fifth decade, 11.8% in the sixth decade and 12.2% in the seventh and over decades.

On a linear model for logistic regression, a history of dental treatment ($P = 0.001$) and several trips abroad ($P = 0.014$) were associated with infection with HDV. Surgical interventions, blood transfusion, needle sticks, tattooing, hajamat, extramarital sexual contacts, intravenous drug abuse, a family history of hepatitis, place of residence (rural/urban) and war injuries were not good predictors of infection with HDV in our hepatitis B surface antigen (HBs-Ag) positive patients.

Discussion

We investigated the distribution of HDV infection and the associated risk factors for its transmission in a large sample of HBs-Ag positive patients in Iran. The overall prevalence of seropositivity of anti-HDV was 9.3% and higher in comparison to some earlier studies.[6] On the other hand, the significant decrease of infection which was observed in younger patients agrees with the decrease in rates of infection compatible with other parts of the world. The high

Table 1 Liver functional tests in Iranian hepatitis B surface antigen positive patients

		ALT	*AST*	*Platelet*
Inactive HBV ($n = 300$)	Anti-HDV negative	23.7 (7.7)	23.8 (6.2)	208696.4 (66458.0)
	Anti-HDV positive	22.6 (7.7)	24.1 (6.0)	208416.7 (75787.3)
	P value	0.614	0.830	0.983
Chronic hepatitis B (n = 547)	Anti-HDV negative	106.6 (169.9)	90.0 (152.6)	195407.3 (378868.0)
	Anti-HDV positive	105.6 (211.5)	61.9 (51.8)	232484.3 (446845.7)
	P value	0.614	0.830	0.983

ALT, alanine aminotransferase; AST, aspartate aminotransferase; HBV, hepatitis B virus; HDV, hepatitis D virus

prevalence of HDV infection in this study compared with previous reports may be due to a better sample collection and may not necessarily be a true indication of an increasing rate of infection. The significant relation between the age of patients with a prevalence to infection in this study corresponds with cohorts who were infected decades ago but who survived acute HDV infection which correlates with studies from other countries.[7]

We believe that the widespread use of disposable needles for injections[8] may be the main reasons for a decrease in the rate of HBV infection.[9] HBV vaccination should ultimately control HDV in parallel. However, reducing risk behaviour is still a major preventive method because individuals chronically infected with HBV continue to be at risk of contracting HD.[10]

While co-infection of HBV and HDV usually results in a more severe disease, a superinfection of HDV can manifest as a severe acute hepatitis in previously asymptomatic HBV carriers. This almost always results in chronic infection with both viruses and, as a consequence, it may appear as a higher prevalence of HDV in chronic HB (compared to inactive carriers) in cross-sectional studies such as this. The high rate of HBV/HDV co-infection in our patients indicates a need for a close survey of potential adverse events.

In the present study, dental intervention and several trips abroad were seen as good predictors for HDV infection. It is expected that some risk behaviors (e.g. intravenous drug use and extra marital sexual contact) are underestimated in retrospective and self-reported surveys according to the cultural and legal concerns of our population. Sufficient education about risk behaviors and explanation of being super-infected by HDV is necessary. This would require that health-care givers and dentists work in close association.

Conclusion

A decline in the prevalence of HBsAg carriers due to universal HBV vaccination, the improvement in socioeconomic conditions and changes in the behaviour of intravenous drug users, and in sexual practice, in response to HIV infection have probably contributed to the declining incidence of HDV infection in Iran as in the rest of the world.

Acknowledgements

This study was supported by a grant from Baqiyatallah University of Medical Sciences and Liver and Gastrointestinal Diseases Research Center of Tabriz University of Medical Sciences.

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The incidence of selected congenital malformations during a two-year period in Tehran, Iran

Salaheddin Delshad MD*
Ahmad Khalegnejad Tabar MD†
Hadi Samae MD*
Mansour Mollaean MD‡
Seyyed Javad Nasiri MD*
Seyyed Mohammad Jazayeri MD†
Yashar Moharamzad MD*
Arash Amini MD‡

*Department of Pediatric Surgery, Ali Asghar Children Hospital, Iran University of Medical Sciences, Tehran;
†Shahid Beheshti University of Medical Sciences, Tehran;
‡Tehran University of Medical Sciences, Tehran, Iran

Correspondence to: Yashar Moharamzad, Department of Pediatric Surgery, Ali Asghar Children Hospital, Iran University of Medical Sciences (IUMS), Zafar Ave., Tehran, Iran
Email: yasharpop@hotmail.com

TROPICAL DOCTOR 2009; **39**: 156–158
DOI: 10.1258/td.2008.070434

SUMMARY In this descriptive cross-sectional study carried out from March 2005 to March 2007, 410 congenital malformations were recorded among 61,112 live births in