

Infection with human immunodeficiency virus and hepatitis viruses in Chinese drug addicts

T. BAOZHANG¹*, Z. KAINING², K. JINXING¹, X. RUCHANG¹, L. MING¹,
Z. CAIXIA¹ AND T. LI¹

¹ Department of Infectious Diseases, the First Affiliated Hospital of Kunming Medical College, 650031, Kunming, P.R. China

² Institute for Health Sciences, Kunming Medical College, 650031, Kunming, P.R. China

(Accepted 27 May 1997)

SUMMARY

The prevalence of antibody against hepatitis C virus (anti-HCV) and five hepatitis B virus markers (HBVM) was measured in 176 Chinese drug addicts, of whom 23 were AIDS patients. Of 176 drug addicts, 147 were members of ethnic minorities while 29 were Han, the majority ethnic group. The total prevalence rates of anti-HCV and HBVM were 35·8% and 50·6% respectively, significantly different ($P < 0\cdot01$). Anti-HCV and HBVM were together found in 22·7%. Similar prevalence rates were found among the different ethnic groups. Among the ethnic minorities, there was a significantly higher prevalence rate of anti-HCV in intravenous drug addicts (IVDA, 51·1%) than in oral drug addicts (20·3%). Furthermore, the prevalence of anti-HCV was significantly higher in needle-sharing abusers (60·4%) than in non-needle sharing ones (37·1%, $P < 0\cdot05$). The prevalence of HBVM was also significantly higher in needle-sharing abusers (69·8%) than in non-needle sharing ones (34·3%). Prevalence of HBsAg was significantly higher in drug abusers with AIDS (47·8%) than in IVDA only (16·1%). The anti-HCV positive rates among ethnic minority people were: for the Yi people 69·2%, the Hui 55·6%, the Bai 53·9%, the Dai 26·8% and the Wa 23·1%. No obvious difference was identified for HBVM. The prevalence rates of HCV, HBV and HCV+HBV in IVDA showed no significant difference ($P > 0\cdot05$) between the two regions. HIV, HCV and HBV infections may promote each other and be related to needle-sharing behaviour in drug abuse and to different subcultures and living habits.

INTRODUCTION

Yunnan Province, one of the 23 provinces of China, is located in the southwest bordering on Laos, Myanmar (previously known as Burma), and Vietnam. The population of Yunnan Province is about 37 million. About one third of the population belong to ethnic minority groups, while the rest are Han, the national ethnic majority group. Among the ethnic minorities,

there are 25 groups with a population more than 4000 each.

Drug abuse is an increasing problem in China. However, papers on drug addictions in China have not considered hepatitis B virus (HBV) or hepatitis C virus (HCV) infections in ethnic minority drug addicts, and drug addictive AIDS patients [1, 2]. This paper reports studies done in two districts, Dehong Prefecture (District) and Lincang Prefecture, in Yunnan Province, both of which border on Myanmar (Fig. 1).

* Author for correspondence.



Fig. 1. Yunnan Province, China showing the study areas.

MATERIALS AND METHODS

Study population: Drug addicts with and without AIDS

Anti-HIV was assayed by ELISA (Sanofi Diagnostics Pasteur, Marnes-la-Coquett, France) and diagnosed by Western Blot from Institute of Virology, Chinese Academy of Preventive Medicine. The authors provided services as volunteers in the community of the drug addicts. In total, 176 drug addicts from Dehong Prefecture (District) and Lincang Prefecture in Yunnan Province, 160 males and 16 females, were selected randomly. The mean age was 23.5 years (range 14–44 years). Of these 153 individuals from Lincang were negative for anti-HIV on initial test, and the other 23, from Dehong, were clinically diagnosed as AIDS. Of the 176 drug addicts, 29 were from Han ethnic group and 147 from ethnic minorities, including 56 Dai, 18 Hui, 13 Bai, Yi and Wa respectively, 9

Jingbo, 8 Lahu and 17 other minorities. Of 153 cases from Lincang, 72 were oral drug addicts (59 minority people and 13 Han people) and 81 were intravenous drug abusers (IVDA, 71 minority people and 10 Han people). Twenty-three cases from Dehong were all intravenous drug abusers (17 minority people and 6 Han people). All of the drug abusers were heroin addicts. The duration of drug use ranged from 3 to 72 months, with a frequency of 1–5 times per day. Eighty-five percent of drug abusers used non-sterile syringes. Sixty-two shared syringes and needles (53 minority people and 9 Han people). Forty-two were non syringe-sharing drug abusers (35 minority people and 7 Han people). None had received blood transfusions or blood products.

Serological assays

Serum samples were stored at -30°C until all were

Table 1. Analysis of HCV and HBV infections in Chinese drug addicts

Anti-HCV positive rates (%)				HBVM positive rate (%)	
HBVM(+)	HBVM(-)	Anti-HBc(+)	Anti-HBc(-)	Anti-HCV(+)	Anti-HCV(-)
36/76 (47.4)	21/71 (29.6)	26/51 (51.0)	31/96 (32.3)	36/57 (63.2)	40/90 (44.4)
$P < 0.05$		$P < 0.05$		$P < 0.05$	

Table 2. Comparison of potential risk factors of HCV and HBV infections in minority drug addicts

Mode of drug use	Anti-HCV-positive rates (%)		HBVM-positive rates (%)	
Oral	12/59 (20.3)	$P < 0.01$	27/59 (45.8)	$P > 0.05$
Intravenous	45/88 (51.1)		49/88 (55.7)	
Syringe				
Single	13/35 (37.1)	$P < 0.05$	12/35 (34.3)	$P < 0.01$
Shared	32/53 (60.4)		37/53 (69.8)	

Table 3. The prevalence of HCV and HBV in different ethnic groups

Ethnic group	Anti-HCV-positive rates (%) ($P < 0.05$)	HBVM-positive rates (%) [*] ($P > 0.05$)
Dai	15/56 (26.8)	30/56 (53.6)
Hui	10/18 (55.6)	10/18 (55.6)
Yi	9/13 (69.2)	7/13 (53.9)
Bai	7/13 (53.9)	6/13 (46.2)
Wa	3/13 (23.1)	3/13 (23.1)
Jingbo	4/9 (44.4)	4/9 (44.4)
Lahu	4/8 (50.0)	4/8 (50.0)
Others	5/17 (29.4)	12/17 (70.6)

* By any marker.

tested at the same time. Samples were tested for five HBV markers (HBsAg, HBeAg, anti-HBs, anti-HBe and anti-HBc), and for antibody to HCV and HIV, HBVM and anti-HCV were assayed by ELISA (Shanghai SIIC Kehua Biotech). Positive and negative controls were available for each kit. Exposure to HBV could be detected by one positive result for any of five HBV-positive markers. The cut off point for anti-HCV was the positive control value multiplied by 0.146. Anti-HIV was assayed by ELISA, and diagnosed by Western Blot.

Clinical diagnosis of AIDS was based on the CDC criteria used in China. Thirteen cases of AIDS-related complex and 10 cases of AIDS were recognized.

RESULTS

The overall prevalence of HBV and/or HCV was 111/176 (63.1%) and for the anti-HCV was 63/176 (35.8%). Evidence of hepatitis B was found in 89/176 (50.6%); of HCV and HBV was found in 40/176 (22.7%).

In the ethnic minority group prevalence were 57/147 (38.8%) for HCV, 76/147 (51.7%) for HBV and 36/147 (24.5%) for HCV+HBV. In the Han group, prevalence were 6/29 (20.7%) for HCV, 13/29 (44.8%) for HBV and 4/29 (13.8%) for HCV+HBV. There was no marked difference between the two groups ($P > 0.05$).

Analysis of HCV and HBV infections in ethnic minorities and the potential risk factors were shown in Tables 1 and 2.

Of 57 individuals who had anti-HCV, 8 (14.0%) were also positive for HBeAg, and only 4 (4.4%) were positive for HBeAg among 90 cases of anti-HCV negative. The difference was significant ($P < 0.05$).

The prevalence of HCV, HBV and HCV+HBV among IVDA was 39/71 (54.9%), 40/71 (56.3%) and 20/71 (28.2%) in Lincang Prefecture, and 6/17 (35.3%), 9/17 (52.9%) and 6/17 (35.3%) in Dehong Prefecture. The difference between the two groups was not significant ($P > 0.05$).

Comparison of the overall prevalence of HCV and HBV in different ethnic groups is shown in Table 3.

The positive rates of HBsAg, HBeAg, anti-HBs, anti-HBe, anti-HBc in IVDA with anti-HIV negative and in drug addictive AIDS patients are shown in

Table 4. *HBV markers in HIV-ve and AIDS patients*

	IVDA with anti-HIV negative	Drug addictive AIDS patients	<i>P</i> value for comparison between two groups
HBsAg	13/81 (16.1%)	11/23 (47.8%)	$P < 0.01$
HBeAg	6/81 (7.4%)	4/23 (17.4%)	$P > 0.05$
Anti-HBs	19/81 (23.5%)	3/23 (13.0%)	$P > 0.05$
Anti-HBe	14/81 (17.3%)	0/23 (0.0%)	$0.01 < P < 0.05$
Anti-HBc	30/81 (37.0%)	7/23 (30.4%)	$P > 0.05$

Table 4. There was a high significant difference in HBsAg ($P < 0.01$), and a significant difference in anti-HBe ($0.01 < P < 0.05$) between the two groups.

DISCUSSION

In this study high prevalence of HIV, HCV and HBV were found among drug abusers in two districts of Yunnan Province bordering Myanmar. It was quite common that an individual had been infected by more than one virus. The prevalence of HBV (58.2%) was similar to that reported elsewhere in China [3]. The results show that HBV is the predominant hepatitis virus infection and that no significantly demographic difference was found in HCV, HBV and HCV + HBV infection rates between the Han and ethnic minority groups.

In the analysis of potential risk factors of HCV and HBV infection among ethnic minorities, we found that the prevalence of HCV was much higher in IVDA than in oral drug abusers, with no evident difference for HBV. Probably some of oral drug abusers had been infected with HBV before they took drugs. The prevalence of HCV and HBV was significantly higher in the syringe-sharing group than in the non-syringe-sharing group. In our study with HCV and HBV, we found that the infection rate with any one virus was higher in the dual positive group than in negative group. It is suggested that one virus infection may in some way enhance susceptibility to another. The same phenomenon could be observed in HBV infection among single-drug abusers and drug-addictive AIDS patients, with a higher positive rate of HBV in the latter than in the former. Coinfection of HIV, HCV and HBV were found in the drug-addictive AIDS patients from Dehong Prefecture, with the overall infection rate 35.3%. Schneiderman and colleagues [4] reported that 89% of their AIDS patients were

infected by HBV. Sherman and colleagues [5] reported that the positive rate of anti-HCV was 8.8% in HIV-positive cases. This might result mainly from sharing modes of transmission of the three viruses with IVDA implicated. Zanetti and colleagues [6] reported that HCV-RNA levels were significantly higher ($P < 0.05$) in mothers with HIV coinfection than those with HCV alone. Hirschman and colleagues reported that 90% of their AIDS patients were infected concomitantly with HBV [7], and suggested that the mechanism was that the cells infected by HBV could produce an unknown protein, which supports replication of HIV. In Botti's study of 122 IVDA the prevalence of HIV, HBV and HCV showed that positive HIV could enhance the infection of HBV and HCV [8]. Koblin [9] and Eyster [10] and their colleagues suggested that HBV DNA and HCV RNA levels respectively was higher in HIV-positive than in HIV-negative multitransfused haemophiliacs, as HIV-induced immune deficiency may promote increased replication of HBV and HCV.

In the comparison of the ethnic minority IVDA in Dehong and Lincang Prefectures, no evident difference was identified for the prevalence of HCV, HBV and HCV + HBV. However, the prevalence of HCV showed a marked difference among drug population of ethnic minorities, with a higher infection rate in the Yi, Hui, and Bai, and a lower one in the Dai and Wa. This fact may be attributed primarily to the different population of drug oral or IV and of non-sterile syringe or sharing, and perhaps to different habits of diet and other life style. HBV prevalence showed no obvious change. A proportion of subjects in our test might have been infected with HBV before their drug abuse, for there is a high prevalence of HBV in China.

Because none of the subjects in our study had a history of blood transfusion or intake of blood products, the results suggest that HIV, HBV and

HCV infections were closely associated with drug abuse, especially intravenous drug use.

ACKNOWLEDGEMENTS

This study was sponsored by the Yunnan Science and Technique Foundation (YSTF). The authors are grateful to the Yunnan Science and Technique Foundation, although the point view appeared in this paper does not necessarily reflect opinions the YSTF. We also thank the staff of Lincang Anti-epidemic Station and Dehong Anti-epidemic Station for their generous and effective assistance in this study.

REFERENCES

1. Ye SR, Huang HL, Hang DK, Zhang ZY, Liu XY, Zhao L. Prevalence of antibody to hepatitis C virus in 177 drug addicts. *Chin J Epi* 1993; **14**: 45–8.
2. Tang BZ, Ton L, Yan QR, et al. A survey on HIV and HV infections of Heroin addicts in Lincang and Kunming. *Chin J Prevent Med* 1995; **29**: 228–30.
3. Li Wen. Summary of the 1993 Beijing International Conference on Viral Hepatitis. *Chin J Intern Med* 1994; **33**: 273–4.
4. Schneiderman DJ, Arenson DM, Cello JP, Margaretten W, Weber TE. Hepatic disease in patients with the acquired immune deficiency syndrome (AIDS). *Hepatology* 1987; **7**: 925–30.
5. Sherman KE, Freeman S, Harrison S, et al. Prevalence of antibody to hepatitis C virus in patients infected with the human immunodeficiency virus. *J Infec Dis* 1991; **163**: 414–5.
6. Zanetti AR, Tanzi E, Paccagnini S, et al. Mother-to-infant transmission of hepatitis C virus. *Lancet* 1995; **345**: 289–91.
7. Hirschman SZ, Zucker ML. Recombinant DNA related to hepatitis B and human immunodeficiency viruses in mononuclear cells of patients with AIDS. *J Med Virol* 1988; **26**: 145–52.
8. Botti P, Pistelli A, Gambassi F, Zorn AM, et al. HBV and HCV infection in i.v. drug addicts; coinfection with HIV. *Arch Virol (Suppl.)*, 1992; **4**: 329–32.
9. Koblin BA, Taylor PE, Rubinstein P, Stevens CE. Effect of duration of hepatitis B virus infection on the association between human immunodeficiency virus type-1 and hepatitis B viral replication. *Hepatology* 1992; **15**: 590–2.
10. Eyster ME, Fried MW, Bisceglie AMD, Goedert JJ. Increasing hepatitis C virus RNA levels in hemophiliacs: relationship to human immunodeficiency virus infections and liver disease. *Blood* 1994; **84**: 1020–3.