

ASSESSMENT OF CURRENT EPIDEMIOLOGICAL STATUS OF VIRAL HEPATITIS IN GUANGDONG PROVINCE, CHINA

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Abstract. Descriptive epidemiology was employed to analyze the current epidemiological status of viral hepatitis and strategies for control of viral hepatitis in Guangdong Province, China. The average incidence rate (IR) was 52.21 per 100,000 during 1991-2001 with a decrease of 37.98% from 79.10 per 100,000 in 1991 to 44.61 per 100,000 in 2001. Hepatitis B constituted 79.1% of total hepatitis cases. The Pearl River Delta Region had the highest prevalence of viral hepatitis, with the highest IR in the 20-35 age-group and the highest seasonal IR from March to May. Since 1991 HAV cases have declined gradually but HBV cases rose gradually with an increase of 2.48 times in constitutive ratio and with an increase of 53.35% in IR from 1991 to 2001. HBV vaccination in the newborn resulted in decreasing IR of the viral hepatitis and HBsAg carrier rate in infants. As to an increase of IR of the viral hepatitis in the 20-35 age group, it is suggested that HBV vaccination should be performed in adults and juveniles, especially in the social workers and the employees in public services.

INTRODUCTION

Viral hepatitis is one of the commonest diseases in Guangdong Province, China, especially that due to hepatitis B virus (HBV). Since the 1980s, the incidence rate (IR) of viral hepatitis in Guangdong ranked ahead in China as a whole. According to seroepidemiological investigation in the mid-1990s the IR ranked first in the nation (Dai and Qi, 1997). Over the past 10 years HBV vaccine has been used to inoculate the newborn in Guangdong. In order to assess the hepatitis epidemic status and adjust the strategy of viral hepatitis management in Guangdong, we have analyzed the epidemiologic data of viral hepatitis in the province.

MATERIALS AND METHODS

Epidemiologic data were collected for viral

hepatitis from 1991 to 2001; this database comprised annual incidence and mortality in the total population in Guangdong. The method of descriptive epidemiology was employed. The administrative region was the standard outlined in 1991. The viral hepatitis cases were classified into HAV, HBV, other typed hepatitis and non-typed hepatitis.

RESULTS

Incidence

The viral hepatitis cases totaled 407,944 during 1991~2001; gross IR was 52.21/100,000. A total of 3,5261 cases of viral hepatitis were reported in 2001, with an annual IR of 44.61/100,000, a reduction of 37.98% in comparison with 71.93/100,000 in 1991, as shown in Table 1. During the whole period, deaths due to viral hepatitis were 578; a death rate (DR) of 0.074/100,000; and case fatality rate (CFR) of 0.142. In 2001 the DR was 0.067/100,000 and the CFR was 0.15%.

Regional distribution

The IRs in Guangdong were recorded in

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Table 1
The viral hepatitis incidence during 1991-2000.

Year	No. of cases	IR (1/100,000)	No. death	DR (1/100,000)	FR (%)
1991	46,455	71.93	62	0.096	0.133
1992	40,927	61.93	57	0.086	0.139
1993	41,399	61.28	47	0.070	0.116
1994	35,873	52.28	44	0.064	0.123
1995	33,864	48.49	54	0.077	0.155
1996	31,230	44.03	55	0.078	0.176
1997	35,714	48.00	61	0.085	0.171
1998	34,626	47.70	44	0.061	0.127
1999	36,805	49.17	36	0.048	0.096
2000	35,791	47.38	65	0.086	0.182
2001	35,261	44.61	53	0.067	0.150
Total	407,944	52.21	578	0.074	0.142

four regions as follows: (1) the Pearl River Delta Region: inclusive of Foshan (114.65/100,000), Zhongshan (95.32/100,000), Zhuhai (91.62/100,000), Guangzhou (87.84/100,000), Jiangmen (82.74/100,000); (2) the Pearl River Delta Region and its outside: inclusive of Shaoguan (71.62/100,000), Dongguan (71.56/100,000), Shenzhen (64.01/100,000), Zhaoqing (62.65/100,000); (3) The outside of the Pearl River Delta Region: inclusive of Qingyuan (50.09/100,000), Meizhou (48.19/100,000), Shantou (45.41/100,000), Huizhou (43.51/100,000); (4) Eastern and Western Guangdong: inclusive of Maoming (32.26/100,000), Zhanjiang (28.17/100,000), Yangjiang (26.50/100,000), Chaozhou (22.86/100,000), Shanwei (20.90/100,000), Heyuan (18.12/100,000) and Jieyang (13.74/100,000). There were different IRs in the four regions, the highest IR being in Foshan. It was evident that the IR in the Pearl River Delta Region as a whole was the highest and that the lowest was in Eastern and Western Guangdong in the Province, except areas in Northern Guangdong, such as Shaoguan.

Time distribution

The incidence cases were highest in April-May from 1991 to 2001 with 10.44% of the total annual cases. the lowest were in December with 5.54%, with a difference of 88.45%

between the highest and the lowest. The average monthly number of cases was 57.25% of total annual cases from March to May, being the epidemic peak.

Population distribution

There were more male than female cases during 1993-2001, the ratio of male to female averaging 2.36:1 (21,3638/90,525), ranging between 2.16:1 and 2.50:1. There were similar orders of proportions of occupational groups affected every year, including 29.02% of peasants, 15.84% of laborers, 12.64% of students.

Age distribution

The features of age distribution of the cases were as follows: (1) The peak incidence was in the 20-30 age-group with 38.97% (124,907/320,562) of the total; (2) The incidence of cases gradually decreased annually in the 0-10 age group during 1993-2001, but gradually increased annually in the 20-30 age group. The incidence curve moved to the right, with the peak in the 25 years age group during 1996-2001 compared with the 20 years age group during 1993-1995. The age distribution is shown as Table 2.

Hepatitis typing

HAV and HBV were predominant in

Table 2
Age distribution of hepatitis incidence during 1993-2001.

Year	Age group																Un- known	Total
	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-		
1993	6.92	11.84	7.53	7.76	14.06	12.54	9.58	7.30	5.48	3.85	3.20	2.84	2.51	1.61	0.94	0.81	1.23	100.00
1994	6.03	11.81	6.03	7.38	14.77	12.80	10.74	7.05	5.52	4.33	3.34	3.07	2.84	1.87	1.19	0.90	0.34	100.00
1995	3.66	6.58	4.31	6.88	15.22	14.33	11.37	6.81	6.24	4.79	3.69	3.38	2.98	2.19	1.26	1.01	5.29	100.00
1996	3.27	5.31	4.09	7.19	15.42	15.57	11.94	7.44	7.20	5.24	4.33	3.77	3.87	2.42	1.49	1.13	0.52	100.00
1997	3.43	6.80	4.75	8.27	14.10	14.95	11.38	7.53	6.90	5.20	4.08	3.12	3.48	2.30	1.57	1.08	1.06	100.00
1998	2.88	5.07	4.35	8.26	13.90	15.95	12.28	8.82	7.02	5.18	4.40	3.09	3.16	2.36	1.57	1.04	0.68	100.00
1999	3.04	4.94	4.06	8.71	13.84	15.84	11.96	8.59	6.83	5.45	4.28	3.28	3.24	2.55	1.70	1.17	0.52	100.00
2000	2.31	3.80	3.56	8.41	14.27	16.40	13.01	9.63	6.27	5.64	4.77	3.03	3.19	2.39	1.67	1.18	0.46	100.00
2001	2.08	3.18	4.06	9.12	14.09	16.00	12.65	9.07	6.50	5.68	4.75	3.38	3.13	2.68	1.80	1.41	0.45	100.00
Total	3.88	6.91	4.80	7.90	14.42	14.86	11.57	7.94	6.43	4.99	4.03	3.19	3.16	2.22	1.44	1.05	1.22	100.00

Note: The data are the constitutive ratio of the case number of viral hepatitis that year.

Table 3
Hepatitis typing in Guangdong during 1991-2001.

Year	HAV		HBV		Non-A-Non-B		Unknown		Total No.
	No.	%	No.	%	No.	%	No.	%	
1991	14,214	30.6	14,842	31.9	539	1.16	16,860	36.3	43,384
1992	10,553	25.8	17,192	42.0	665	1.62	12,517	30.6	45,912
1993	10,377	25.1	18,907	45.7	923	2.23	11,192	27.0	31,601
1994	7,227	20.1	18,537	51.7	995	2.77	9,114	25.4	31,858
1995	5,061	14.9	20,762	61.3	1,105	3.26	6,936	20.5	31,273
1996	4,280	13.7	20,279	64.6	516	1.65	6,155	19.7	31,206
1997	5,483	15.3	22,897	64.1	786	2.20	6,548	18.3	35,714
1998	4,237	12.2	23,777	68.7	696	2.01	5,916	17.1	34,626
1999	4,087	11.1	25,960	70.7	818	2.22	5,939	16.2	36,804
2000	2,946	8.23	26,616	74.4	904	2.53	5,325	14.9	35,791
2001	2,214	6.28	27,890	79.1	918	2.60	4,239	12.0	35,261
Total	70,679	17.5	237,659	58.9	8,865	2.20	90,741	21.4	403,705

Note: Percentage is the constitutive ratio of the type of the viral hepatitis in that year.

causing viral hepatitis in Guangdong. The cases of HBV constituted 58.9% of total cases; HAV constituted 17.5%, together they accounted for 76.4%, as shown in Table 3. The characteristics of viral hepatitis of all types during 1991-2001 included the following: (1) The proportion of HAV gradually decreased from 30.6% in 1991 to 6.28% in 2001, IR from 22.01/100,000 in 1991 to 2.80/100,000 in 2001;

(2) The proportion of cases of HBV increased annually, 87.9% (27,890:14,842) more in 2001 than in 1991; the constitutive ratio of HBV rose from 31.9% in 1991 to 79.1% in 2001, the IR from 22.98/100,000 in 1991 to 35.28/100,000 in 2001; the constitutive ratio of HBV rose 2.48 times (31.9%:79.1%), with an IR elevation of 53.35% (35.28/100,000 from 22.98/100,000); (3) The non-typed hepatitis gradually

decreased since 1991, with 25.14% of the cases in 1991; (4) Total cases gradually decreased since 1991, to the lowest level in 1996 then rising again.

DISCUSSION

Surveillance of viral hepatitis

In summary, the IR of HAV gradually decreased and the IR of HBV gradually increased from 1991 to 2001. The epidemic pattern was divided into two phases: in the first, the gross IR of viral hepatitis gradually decreased during 1991-1996, due to the reduction of HAV; in the second, the gross IR increased slightly during 1996-2001, resulting from decreasing HAV and increasing HBV. The HAV decrease reflected the absence of outbreaks and the inoculation of HAV vaccine. The HBV IR gradually increased as a consequence of several factors: (1) The IR of HBV increased in some areas; (2) The typing of viral hepatitis rose, with the consequent decrease in recording of non-typed hepatitis and increased recording of HBV cases; (3) Under-reporting of infectious cases decreased. These changes underscore the necessity of strengthening the surveillance of the viral hepatitis, and the control of epidemic tendencies in time.

Guangdong was the prevailing epidemic region of viral hepatitis, especially in HBV. According to the national epidemiological investigation of the viral hepatitis reported in the mid-1990s the carrier rate of HBsAg reached 17.85% in Guangdong (Dai and Qi, 1997). After vaccination with HBV vaccine for 10 years, the IR of the viral hepatitis under 10 years decreased and the IR curve of age-groups moved to the right, but the IR in the 20-35 age-group increased gradually. The cause of the latter increase requires further investigation. Compared with Eastern and Western regions of Guangdong, the high IR in the Zhujiang Delta Region resulted from the following factors: (1) increasing probability of communication resulting from economic development and personnel movement; (2) decreasing the miss-reporting of contagious disease. In addition,

the IR of peasants was not higher than other occupations as the peasant group a high proportion of the population, as the constitutive ratio in the peasants ranked first in the occupation. The high IR of viral hepatitis in Shaoguan may have resulted from the increasing of communication per the development of the Beijing-Guangzhou Railway, for example. With further diagnosis of more recently identified hepatitis types the situation will become clearer: *eg* in 2000, the infectious rate of HDV was 1.29% in Guangdong, being lower than the average level of whole nation. (Huang *et al*, 2001a).

Investigation of newly defined hepatitis viruses

In the above statistics, for the sake of diagnosis, viral hepatitis included two groups now recognized: the typed viral hepatitis (HAV, HBV, HCV, HEV) and the non-typed viral hepatitis. Recognition of HEV was introduced in 1988, HCV in 1989, HGV in 1995. The discovery and identification of new types of viral hepatitis improved the scope and precision of diagnosis of viral hepatitis. The typing precision of viral hepatitis will further enhance the diagnostic technology and the economic development of less advanced regions. However, there were 12.0% cases of in the overall picture, which were non-typed cases of viral hepatitis. It has been found that there is a relationship between cases of viral hepatitis with TTV discovered in 1997 and with TLMV discovered in 2001. It is worth further research as to whether these and/or other new viruses induce clinical viral hepatitis (Huang *et al*, 2001b).

Adjustment of preventive strategies

HAV and HEV are communicable by way of the fecal - oral route (Wang *et al*, 1998). On the other hand, HBV, HCV and HEV are contagious by blood and blood products. The strategy of preventing transmission of communicable disease can be identified as "three-kill and one management", involving better management of environment health and personal hygiene. The approach to preventing HBV

(Wang *et al*, 1998), HCV and HGV infection is to strengthen the management of blood and blood products and to avoid nosocomial infection.

HAV vaccination is attractive as the HAV vaccine is very effective. HBV vaccine is also attractive: cheap, effective, easily manipulated, suitable for mass inoculation. The inoculation of HBV vaccine in the newborn has reduced the incidence of cases of HBV in the 14-age group. It is worth noting, however, that the IR of the 20-35 age group appeared to show an increasing trend. Focusing on the viral hepatitis situation with high IR in adults, it is suggested that there is a need to expand the scope of HBV vaccination; *ie* to do HBV vaccination on newborns more effectively, and in the meantime to carry out HBV vaccination of the workers occupied in social and health service work. The vaccination date should be at the pre-epidemic stage of the viral hepatitis, at the end of autumn and beginning of winter.

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