

**SURVEILLANCE OF VIRAL
HEPATITIS IN HONG KONG
– 2000 Update Report**

**Department of Health
December 2001**

THE SCIENTIFIC WORKING GROUP ON VIRAL HEPATITIS PREVENTION (SWGVHP)

About SWGVHP

The *Scientific Working Group on Viral Hepatitis Prevention* (SWGVHP) was formed by the Department of Health in 1992. It succeeded the work of the previous *Scientific Working Group cum Advisory Committee on Hepatitis B Vaccination*. Constituted by professionals in microbiology, public health and clinical fields, the SWGVHP has the following terms of reference:

- To keep under review local and international trends of viral hepatitis infection
- To advise the Government on the strategy on the prevention of viral hepatitis in Hong Kong.

The Department of Health's Special Preventive Programme provides secretariat support to the SWGVHP. This update report is prepared by the SWGVHP, for the information of health care professionals working on various aspects of viral hepatitis prevention.

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PREFACE

At its 7th meeting of 15 May 1995, the Scientific Working Group on Viral Hepatitis Prevention (SWG VHP) deliberated on the issue of hepatitis surveillance in Hong Kong. The discussions in the meeting led to the suggestions of (a) maintaining a database on the seroprevalences of infective hepatitis in Hong Kong, (b) conducting regular epidemiological studies to supplement existing information on the different forms of infective hepatitis, and (c) alerting the Government, health care providers and researchers on the possible emergence of new epidemiological trends of viral hepatitis. Subsequently, in 1996, 1997 and again in 1999, local epidemiological data on viral hepatitis were collected and published in an "update report" series. The effort represented the first step towards a coordinated system in the description and dissemination of hepatitis surveillance information in Hong Kong.

This is the fourth report on viral hepatitis surveillance that brings updated information as of the end of 2000. In this report, data from on-going programmes were updated through year 2000. Also, new data gathered from other sources in year 2000 were included. However, we deliberately omitted previous years' data that had not contained updated results, so as to minimize duplication of earlier reports. Readers are reminded that this report, similar to previous ones under the same series, is not a primary study but a collection of secondary data on the subject. The original papers and authors should be consulted in case of queries.

In the course of the preparation of the Report, we have received enthusiastic support from health professionals of different agencies. The publication of the Report would not have been possible without their input. Much as we tried to be accurate and concise, we are fully aware of the possibility of errors. We welcome criticisms, suggestions and comments of any kind. These would be important in helping us improve the quality of the next Report.

Secretariat
Scientific Working Group on Viral Hepatitis Prevention
December 2001

EXECUTIVE SUMMARY

This epidemiological report on viral hepatitis in Hong Kong analyzed data from three sources: (a) the statutory notification system, (b) seroprevalence studies and (c) other related publications on the subject. The majority of the new information collected in 2000 has focused on hepatitis B, with little touching on the other types of viral hepatitis.

The statutory notification system has remained a useful mechanism for tracking the pattern of acute viral hepatitis. In recent years, with the exception of the 1992 hepatitis A epidemic, the number of acute viral hepatitis reported per year has been stable at around a few hundred. Similar to the last 2 years, in 2000, about 73% of the reported acute viral hepatitis was hepatitis A virus (HAV) infection. The predominance of HAV infection among acute viral hepatitis corresponded with the data from hospital inpatient statistics. There were recent data suggesting an increasingly important role of hepatitis E (HEV) in Hong Kong.

The seroprevalence of hepatitis B (HBV) markers in Hong Kong has continued to fall. In young adults, such as new blood donors, university students and pre-marital couples, the prevalence of HBsAg is around five percent in 2000. In antenatal women, the drop is less obvious, especially among those not born in Hong Kong. Age is an important factor affecting HBsAg prevalence, with a higher proportion of the older population as chronic HBV carriers or having markers of past infection. The introduction of universal neonatal hepatitis B vaccination in 1988 is expected to lead to a gradual decrease of HBsAg positive rate in the younger age groups but the trend has yet to be determined in these age cohorts involved. As regards populations with high-risk behaviours, the HBsAg positive rate in drug users has generally fallen over the years until 1997, followed by a slowly rising trend again (11.8% in 2000). The prevalence rate in this population is still substantially higher than that in the general population.

The prevalence of hepatitis A markers has also continued to fall in young people. In 2000, anti-HAV is positive in less than 10% of a group of university students aged 20 or less. Although comprehensive information on age-specific prevalence of HAV markers is lacking in recent years, existing data show some evidence of shifting of the age-specific HAV seroprevalence curve to the right.

The Hong Kong Red Cross Blood Transfusion Service has been a major source of data on hepatitis C (HCV) in Hong Kong. In the past ten years, the prevalence of anti-HCV in new blood donors ranged between 0.035% and 0.099%. Two local studies suggested that most common genotype of HCV in Hong Kong is genotype 1b.

Data on HDV, HEV and HGV are too limited for any meaningful interpretation of trends.

1. INTRODUCTION

Viral hepatitis is an important group of infectious diseases in Hong Kong. In human, at least five hepatitis viruses have been documented to give rise to liver inflammation. These viruses are named alphabetically in order of the date of their isolation or diagnosis in the scientific community. They are: hepatitis A (HAV), hepatitis B (HBV), hepatitis C (HCV), hepatitis D (delta agent or HDV), and hepatitis E (HEV). In 1995, hepatitis G virus¹ (HGV) was identified. However, its association with clinical diseases is still a subject of debate. More recently, another transfusion-transmitted virus² (TTV) was described, which is also possibly linked with liver diseases.

Since 1992, the *Scientific Working Group on Viral hepatitis Prevention* (SWGVHP) has been monitoring the hepatitis situation in Hong Kong with an aim to support the development of prevention strategy. In 1996, 1997 and 1999, reports on the surveillance of viral hepatitis were published and it was decided subsequently that these surveillance reports be prepared on a regular basis.

The SWGVHP does not undertake direct surveillance activities. This Report is a compilation of surveillance data collected and collated from various sources, largely in the public sector. In the process, the Group reviews the situation and brings the information updated as of the end of the year 2000. In compiling the Report, the Secretariat tried to focus on the new information identified and collected in 2000. For details of earlier data, readers should refer to the SWGVHP's three previous update reports dated 1996, 1997 and 1999.

2. DATA SOURCES

The production of the 2000 Update Report has, as in the previous three reports, relied on data from three major sources:

- (a) Disease notification system,
- (b) Seroprevalence studies, and
- (c) Published papers or presented abstracts on hepatitis epidemiology or related subjects.

Disease notification system

In Hong Kong, viral hepatitis is a notifiable disease under the *Quarantine and Prevention of Disease Ordinance* (Cap. 141). The notification system is managed by the Department of Health, which publishes an update report in its *Public Health and Epidemiology Bulletin* on a bimonthly basis. This bimonthly update report on notifiable diseases is also posted on the Department's homepage.

Hospital inpatient statistics

Data on the pattern of acute viral hepatitis admitted to the Princess Margaret Hospital, Hospital Authority from 1996 to 1999 have also been included in this Report.

Seroprevalence studies

Seroprevalence studies of viral hepatitis in Hong Kong are conducted by different agencies. Some studies have been conducted specifically to obtain epidemiological data, while others reflect information extracted from clinical or research activities. The main sources of prevalence data in the 2000 Update Report are:

- (a) Screening of donated blood at the Hong Kong Red Cross Blood Transfusion Service;
- (b) Hepatitis B screening programme for antenatal mothers at the Maternal and Child Health Service, Department of Health;
- (c) Premarital screening programme of the Family Planning Association of Hong Kong;
- (d) City University hepatitis awareness programme;
- (e) Hepatitis screening of drug users, Department of Health;
- (f) Pre-vaccination hepatitis screening for police officers and health care workers at Hepatitis Vaccination Clinic, Department of Health;

- (g) HIV/AIDS patients followed up at the Integrated Treatment Centre, Department of Health; and
- (h) Seroprevalence data from Virus Unit, Department of Health.

Published papers or presented abstracts

In Hong Kong, clinical service providers and academic institutes have shown keen interest in the clinical and public health aspects of viral hepatitis through publishing studies or presenting abstracts in this area. A review of publications and presentations serves to enrich the information on hepatitis epidemiology. However, some of the information may overlap with those collected from the two other sources. Readers are reminded that they should refer to the original texts for details.

3. ACUTE VIRAL HEPATITIS

The epidemiology of acute viral hepatitis in Hong Kong could be derived from:

- (a) data from the disease notification system and
- (b) hospital inpatient statistics.

Data from disease notification system

Over the years, the disease notification system has remained a useful source of information for viral hepatitis presenting clinically. In Hong Kong, voluntary reporting of viral hepatitis was started in 1966 by the then Medical and Health Department. Viral hepatitis became a notifiable disease in 1974. From 1988 onwards, the notification system has expanded by including the breakdown of viral hepatitis into hepatitis A, hepatitis B, non-A non-B hepatitis and unclassified infection. Under this system, four categories of viral hepatitis are distinguished, based on the following criteria:

- (a) Hepatitis A – IgM anti-HAV positive
- (b) Hepatitis B – IgM anti-HBc positive (excluding known chronic HBV carrier)
- (c) Non-A non-B hepatitis – negative for the above two markers
- (d) Unclassified hepatitis – data on hepatitis markers inconclusive

Since 1996, hepatitis C and hepatitis E can be distinguished in the reported cases. Those cases that would have been classified into non-A non-B and unclassified hepatitis previously are now grouped into 3 categories:

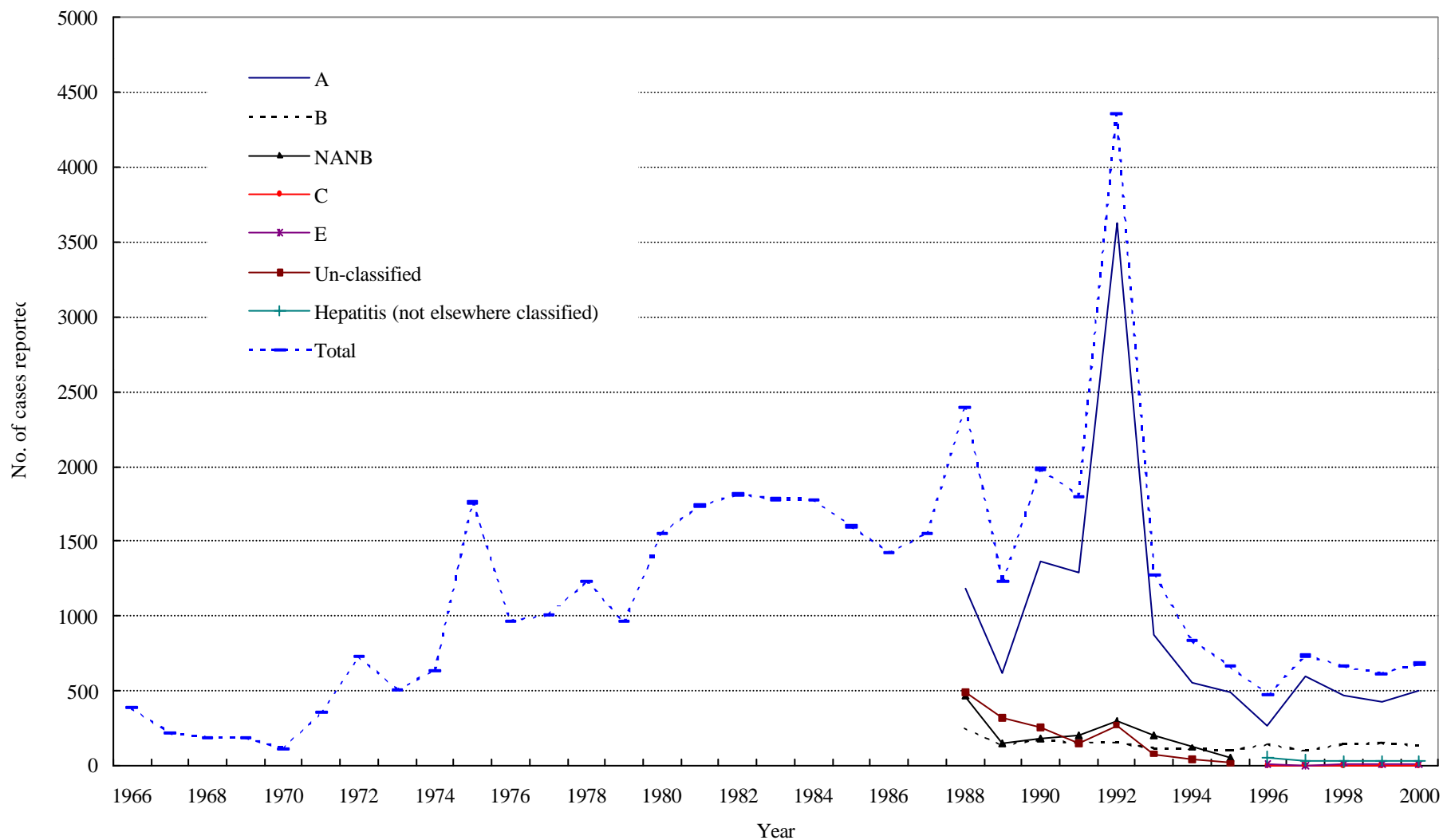
- (e) Hepatitis C – Anti-HCV positive
- (f) Hepatitis E – Anti-HEV positive
- (g) Hepatitis (not elsewhere classified) – includes non-ABCE hepatitis cases and cases which did not have enough serological markers to be classified into any of the above categories.

Box 1 shows the figures for the notified cases in Hong Kong over the past 35 years. Box 2 is a graphical presentation of the time trend of reported hepatitis in the same period. Box 3 shows the breakdown of different types of reported viral hepatitis from 1996 to 2000.

Box 1. No. of cases of viral hepatitis reported to the Department of Health between 1966 and 2000 (Data source: DH)

| Year | A | B | NANB | C | E | Un-classified | Hepatitis (not elsewhere classified) | Total |
|------|--------------------------------|-----|------|---|----|---------------|--------------------------------------|-------|
| 1966 | voluntary reporting since 1966 | | | | | | | 386 |
| 1967 | | | | | | | | 218 |
| 1968 | | | | | | | | 191 |
| 1969 | | | | | | | | 188 |
| 1970 | | | | | | | | 117 |
| 1971 | | | | | | | | 357 |
| 1972 | | | | | | | | 729 |
| 1973 | | | | | | | | 509 |
| 1974 | notifiable since 1974 | | | | | | | 639 |
| 1975 | | | | | | | | 1761 |
| 1976 | | | | | | | | 969 |
| 1977 | | | | | | | | 1008 |
| 1978 | | | | | | | | 1230 |
| 1979 | | | | | | | | 964 |
| 1980 | | | | | | | | 1554 |
| 1981 | | | | | | | | 1738 |
| 1982 | | | | | | | | 1814 |
| 1983 | | | | | | | | 1783 |
| 1984 | | | | | | | | 1780 |
| 1985 | | | | | | | | 1601 |
| 1986 | | | | | | | | 1425 |
| 1987 | | | | | | | | 1554 |
| 1988 | 1187 | 250 | 465 | | | 496 | | 2398 |
| 1989 | 618 | 136 | 154 | | | 324 | | 1232 |
| 1990 | 1362 | 178 | 183 | | | 261 | | 1984 |
| 1991 | 1297 | 150 | 200 | | | 154 | | 1801 |
| 1992 | 3626 | 157 | 301 | | | 273 | | 4357 |
| 1993 | 874 | 116 | 203 | | | 80 | | 1273 |
| 1994 | 557 | 112 | 125 | | | 41 | | 835 |
| 1995 | 491 | 102 | 55 | | | 18 | | 666 |
| 1996 | 264 | 144 | - | 0 | 11 | - | 58 | 477 |
| 1997 | 595 | 100 | - | 0 | 4 | - | 37 | 736 |
| 1998 | 474 | 145 | - | 0 | 16 | - | 29 | 664 |
| 1999 | 426 | 152 | - | 0 | 8 | - | 31 | 617 |
| 2000 | 501 | 136 | - | 0 | 11 | - | 30 | 683 |

Box 2. Reported viral hepatitis from 1966 to 2000 (Data source: DH)



Box 3. Breakdown of different types of reported viral hepatitis from 1996 to 2000. (Data source: DH)



The last hepatitis A epidemic occurred in 1992. There were some 1300 total cases of acute viral hepatitis in 1993, which then fell to between 500 to 800 annually afterwards. In 2000, 683 cases of viral hepatitis have been reported, about 73% of which were hepatitis A. With improvements in sanitation, housing and economic standards, hepatitis A has shifted from an asymptomatic childhood infection to a clinical disease in young adults. The lack of immunity against the virus and the consumption of contaminated food contributed to the reported acute hepatitis A in recent years.

On the other hand, hepatitis B is endemic in Hong Kong, with a high proportion of adults already carrying some markers signifying past infection or chronicity of infection. With the introduction of universal neonatal hepatitis B vaccination in 1988, hepatitis B infection in childhood is conceivably becoming very uncommon. These factors account for the rarity of acute symptomatic hepatitis B, and the predominance of hepatitis A in the overall reported numbers.

There was no hepatitis C infection in the past 5 years among the reported acute viral hepatitis. However, the reporting of acute viral hepatitis may not be an effective means of studying hepatitis C epidemiology.

The number of hepatitis E cases reported yearly varied from 4 to 16 in the past 5 years.

Hospital inpatient statistics

The pattern of reported hepatitis corresponded with the trend depicted in hospital inpatients statistics. In a study of 1304 patients with acute viral hepatitis admitted to a public hospital between 1996 and 1999, episodes due to hepatitis A, B, C, D, E and non-A-E were 723 (55.4%), 425 (32.6%), 3 (0.2%), 0 (0%), 80 (6.1%) and 73 (5.6%) respectively³. (Box 4) However, it should be noted that a distinction between acute and acute-on-chronic hepatitis B infection is difficult in these cases in the absence of previous testing for hepatitis markers.

Box 4. Types of acute viral hepatitis in patients (n=1304) admitted to a public hospital between 1996 and 1999 (Data source: PMH)

| Type of viral hepatitis | No. of patients (%) |
|-------------------------|---------------------|
| A | 723 (55.4%) |
| B | 425 (32.6%) |
| C | 3 (0.2%) |
| D | 0 (0%) |
| E | 80 (6.1%) |
| Non-A-E | 73 (5.6%) |

The data largely echoed those reported to the disease notification system. Hepatitis A, followed by hepatitis B, was the most important causes of acute viral hepatitis. Acute symptomatic hepatitis C was unlikely to be very common in Hong Kong. Acute hepatitis E (HEV) was present in Hong Kong, however, whether there was any changing trend or not cannot be defined due to the small number involved.

4. CHANGING PREVALENCE OF HEPATITIS B MARKERS

Hepatitis B infection is monitored through testing for serological markers resulting from the infection. The commonest markers monitored are:

- (a) HBsAg – present in chronic carriers and also during active acute infection;
- (b) Anti-HBs – indicative of immunity to the virus;
- (c) Anti-HBc – an indicator of natural infection.

Over the past years, a broad range of seroprevalence studies have been conducted. Many of these were conducted on young adults and the others were performed on populations with higher risk of exposure.

Hepatitis B markers in young adults

Data on hepatitis B markers in young adults come mainly from the following ongoing programmes:

- (a) Blood donor screening at the Hong Kong Red Cross Blood Transfusion Service,
- (b) Antenatal testing at the Department of Health's Maternal and Child Health Centres,
- (c) Pre-marital package service of the Family Planning Association of Hong Kong, and
- (d) Hepatitis awareness project of the City University's Health Centre.

New blood donors

The majority of blood donors in Hong Kong are between the age of 16 and 30. Data from the Hong Kong Red Cross Blood Transfusion Service revealed a declining trend of HBsAg prevalence in this group of young adults, from 7.97% in 1990 to 4.15% in 2000 in new donors. (Box 5) However, this population may be a biased one because some known carriers may not go for blood donation, which could account for the low rate in the new donors. The prevalence in repeat donors was below 1%.

Box 5. Prevalence of HBsAg in new blood donors
(Data source: HKRCBTS)

| Year | % HBsAg + |
|-------------|------------------|
| 1990 | 7.97 |
| 1991 | 8.04 |
| 1992 | 7.38 |
| 1993 | 6.70 |
| 1994 | 5.88 |
| 1995 | 5.99 |
| 1996 | 5.57 |
| 1997 | 5.30 |
| 1998 | 4.89 |
| 1999 | 4.44 |
| 2000 | 4.15 |

University students/staff

The prevalence figures obtained in the ongoing hepatitis awareness project launched for the students and staff of the City University of Hong Kong from 1994 to 2000 (Box 6) were similar to those of the new blood donors. In 2000, the HBsAg prevalence was 3.0% for those aged below 21 and 3.1% for those between the age of 21 and 30.

Box 6. HBsAg prevalence among university students/staff (Data source: City University Health Centre)

| Year | Aged below 21 | | | Aged 21 - 30 | | |
|------|--------------------|----------|-----|--------------------|----------|-----|
| | Total no. of cases | HBsAg+ve | | Total no. of cases | HBsAg+ve | |
| | | No. | % | | No. | % |
| 1994 | 305 | 7 | 2.3 | 830 | 29 | 3.5 |
| 1995 | 324 | 10 | 3.1 | 768 | 33 | 4.3 |
| 1996 | 348 | 4 | 1.1 | 762 | 30 | 3.9 |
| 1998 | 371 | 5 | 1.3 | 608 | 21 | 3.5 |
| 2000 | 230 | 7 | 3.0 | 391 | 12 | 3.1 |

Clients of the Pre-marital package service of the Family Planning Association

The falling trend of HBsAg in young adults was also evident in data from the Pre-marital Package Service of the Family Planning Association. (Box 7) The prevalence rates were comparable to the HBsAg positive rates reported in new blood donors and young university students and staff. However, the rates were in general lower than that in antenatal mothers (see below). In 2000, for example, the HBsAg prevalence of young adults attending the Family Planning association was 5.6%, compared to that of 8.9% in the expectant mothers attending antenatal clinics.

Box 7. HBsAg prevalence from the Premarital Package Service (Data source: FPA)

| Year | Total no. of cases | HBsAg +ve | |
|------|--------------------|-----------|-----|
| | | No. | % |
| 1990 | 17,251 | 1,659 | 9.6 |
| 1991 | 19,142 | 1,831 | 9.6 |
| 1992 | 18,445 | 1,708 | 9.3 |
| 1993 | 19,193 | 1,661 | 8.7 |
| 1994 | 16,466 | 1,210 | 7.3 |
| 1995 | 16,798 | 1,320 | 7.9 |
| 1996 | 19,959 | 1,575 | 7.9 |
| 1997 | 17,109 | 1,301 | 7.6 |
| 1998 | 13,163 | 897 | 6.8 |
| 1999 | 12,686 | 851 | 6.7 |
| 2000 | 15,348 | 862 | 5.6 |

Antenatal mothers

The HBsAg prevalence in antenatal mothers has also been falling over the years. The observation carries significant implication as it could be used to predict the future trend of perinatal infection. Results from the HBsAg screening in antenatal clinics demonstrated a steady decline from over 10% in the early 1990s to 8.9% in 2000 (Box 8). Those between the age of 15 and 19 had a lower prevalence of 6.8%, compared to that of 8.7% above the age of 34 in 2000 (Box 9). The results of clients younger than 15 years of age should however be interpreted with care because of:

- The small number involved, and that
- The dataset actually included abortion cases and non-pregnant clients attended for screening of sexually transmitted disease (STD) from sources other than the Maternal and Child Health Centres.

Box 8. HBsAg prevalence in antenatal women (Data source: FHS and Virus Unit, DH)

| Year | No. tested | HBsAg + | |
|------|------------|---------|------|
| | | No. | % |
| 1990 | 31749 | 3574 | 11.3 |
| 1991 | 30075 | 3278 | 10.9 |
| 1992 | 31394 | 3391 | 10.8 |
| 1993 | 34221 | 3456 | 10.1 |
| 1994 | 32470 | 3247 | 10.0 |
| 1995 | 30962 | 3016 | 9.7 |
| 1996 | 31508 | 3072 | 9.7 |
| 1997 | 25892 | 2417 | 9.3 |
| 1998 | 24678 | 2223 | 9.0 |
| 1999 | 23934 | 2114 | 8.8 |
| 2000 | 19090 | 1701 | 8.9 |

Box 9. HBsAg prevalence and age breakdown of antenatal mothers (Data source: FHS, DH)

| Year | No. tested (% positive HBsAg) according to age group | | | | | |
|------|--|-------------|-------------|--------------|--------------|-------------|
| | <15* | 15-19 | 20-24 | 25-29 | 30-34 | >34 |
| 1990 | 447 (6.9) | 1044 (10.3) | 4671 (13.4) | 15228 (10.7) | 7639 (12.6) | 2780 (12.9) |
| 1991 | 86 (5.8) | 987 (10.7) | 4620 (10.7) | 13151(10.4) | 8168 (11.5) | 3063 (11.8) |
| 1992 | 50 (4.0) | 928 (9.6) | 5065 (11.4) | 13093 (10.6) | 8788 (10.6) | 3470 (11.7) |
| 1993 | 30 (10.0) | 984 (9.0) | 5589 (10.5) | 12345 (10.3) | 9395 (11.6) | 3798 (11.0) |
| 1994 | 50 (6.0) | 951 (7.8) | 5723 (9.8) | 11590 (9.7) | 10158 (10.6) | 3998 (10.4) |
| 1995 | 474 (4.3) | 922 (8.4) | 4979 (9.7) | 10619 (9.6) | 10112 (9.8) | 4283 (10.3) |
| 1996 | 97 (6.2) | 842 (7.8) | 4765 (10.3) | 10137(9.5) | 9759 (9.5) | 5908 (10.6) |
| 1997 | 9 (0) | 902 (7.1) | 4207 (9.3) | 8895 (9.6) | 7982 (9.3) | 3897 (9.3) |
| 1998 | 104 (11.5) | 911 (5.8) | 3887 (9.2) | 8507(9.3) | 7418 (8.8) | 2851 (9.3) |
| 1999 | 124 (11.3) | 794 (7.7) | 3777 (8.6) | 8068 (9.3) | 7196 (8.2) | 3975 (9.3) |
| 2000 | 22 (9.1) | 618 (6.8) | 2974 (10.1) | 6466 (9.5) | 5818 (8.0) | 3192 (8.7) |

* The dataset for those aged below 15 included abortion cases and non-pregnant clients attended for STD screening from sources other than the Maternal and Child Health Centres.

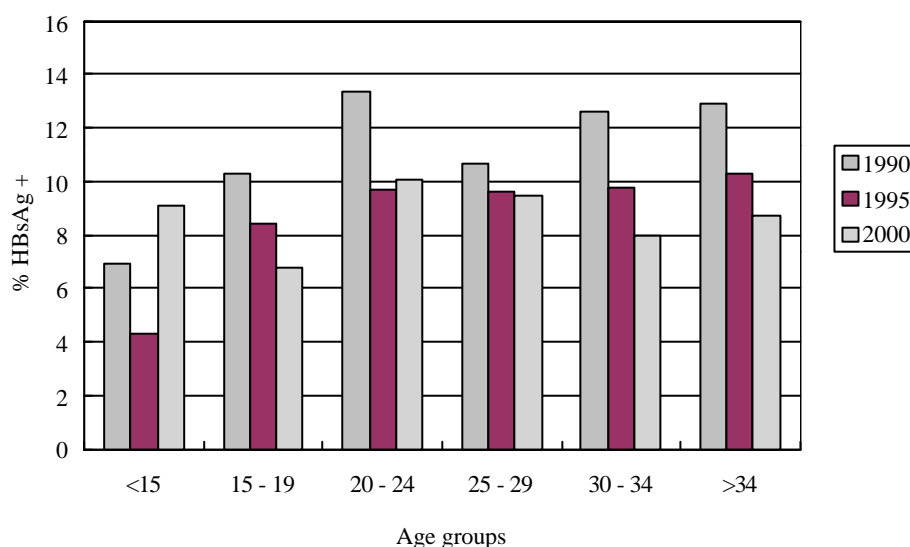
Despite the young age of the antenatal population, the HBsAg rate was generally higher than that in new blood donors, young university students/staff (City University Study) and clients of pre-marital package. One of the confounding factors maybe the place of birth of the individual. A study on 2480 pregnant women attending the Maternal and Child Health Centres in 1996 showed a difference in HBsAg positive rate between locally and non-locally born antenatal mothers⁴. Those born in Hong Kong had a HBsAg prevalence of 8.4%, versus that of 13.1% in those born in Mainland China.

Age and hepatitis B markers

There is a positive correlation between age and the prevalence of hepatitis B markers in a population. Generally speaking, the older a person is, the higher the chance of having been exposed to hepatitis B virus and thus having markers of the infection. This association was illustrated by the HBsAg figures for antenatal mothers in the early 1990s (Box 9 & 10). However, this relationship disappeared after 1998, the reason for which is unclear.

Another more compelling piece of evidence that confirmed this finding was derived from the hepatitis B pre-vaccination screening done for the police force between 1996 and 2000 (Box 11 & 12). The results demonstrated a positive correlation between age and HBV markers, including HBsAg positivity rate, especially in males. In addition, men had a higher prevalence of HBsAg than women for all age groups (Box 12), or were tested positive for any HBV markers in a higher proportion of the subjects. However, it must be cautioned against extrapolating from the figures to the general population because this is a highly selected sample.

Box10 HBsAg prevalence among antenatal mothers of different age groups in 1990, 1995 and 2000 (Data source: FHS, Virus Unit)

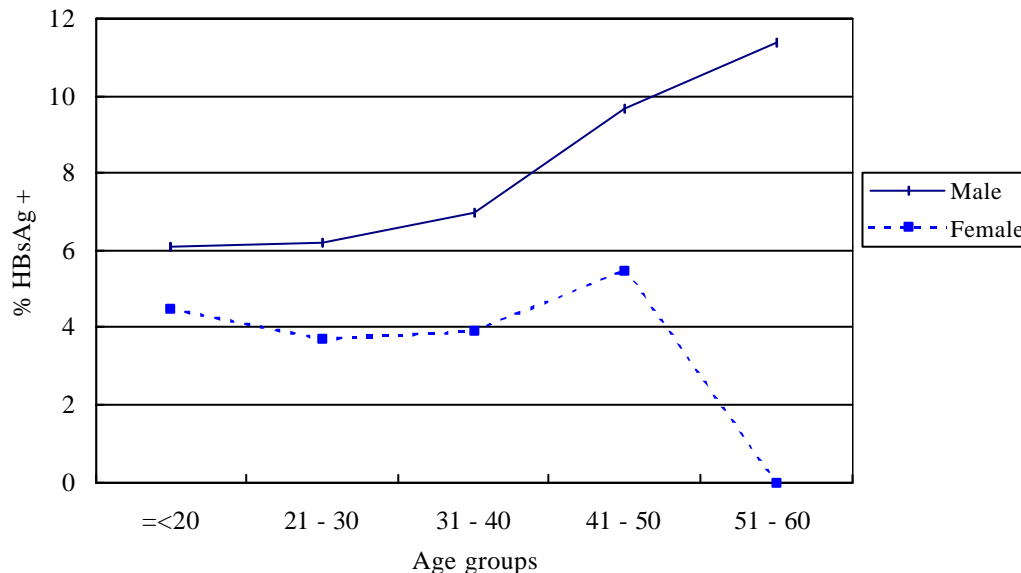


With the introduction of universal hepatitis B vaccination in infants in 1988, changes are expected to occur in the pattern of hepatitis B markers in different age cohorts. Unfortunately, data on age-specific prevalence in children and adolescents is not available and the impact of universal neonatal hepatitis B vaccination has yet to be determined.

Box 11. Prevalence of hepatitis B markers in police officers from 1996 to 2000
(Data source: DH)

| Age | Male | | | | | Female | | | | |
|-------|------------|---------------------|-------|---------------|-------|------------|---------------------|-------|---------------|------|
| | No. tested | +ve for HBV markers | | +ve for HBsAg | | No. tested | +ve for HBV markers | | +ve for HBsAg | |
| | | No. | % | No. | % | | No. | % | No. | % |
| ≤20 | 347 | 101 | 29.1% | 21 | 6.1% | 88 | 22 | 25.0% | 4 | 4.5% |
| 21-30 | 4496 | 1402 | 31.2% | 280 | 6.2% | 1181 | 349 | 29.6% | 44 | 3.7% |
| 31-40 | 4924 | 1982 | 40.3% | 346 | 7.0% | 360 | 127 | 35.3% | 14 | 3.9% |
| 41-50 | 2238 | 1268 | 56.7% | 218 | 9.7% | 289 | 121 | 41.9% | 16 | 5.5% |
| 51-60 | 271 | 166 | 61.3% | 31 | 11.4% | 8 | 4 | 50.0% | 0 | 0% |
| Total | 12276 | 4919 | 40.1% | 896 | 7.3% | 1926 | 623 | 32.3% | 78 | 4.5% |

Box 12. HBsAg prevalence among male and female police officers of different age groups from 1996 to 2000 (Data source: DH)



Hepatitis B serology in occupationally exposed professionals

Health care workers are at risk of HBV infection because of potential occupational exposure to blood and body fluids. In 1983, a study in Hong Kong reported a higher rate of HBsAg in those who had been in service for over 10 years (10.8%) versus those at entry (7.5%)⁵. The rates for anti-HBs were 43.1% and 20.3% respectively.

The HBsAg prevalence was lower in subsequent studies. In 1992 and 1993, HBsAg and anti-HBs were positive in 4.7% and 38.2% of 5825 health care workers screened⁶. The figures were 7% and 36.3% in data collected in a vaccination campaign of the Department of Health in 1995. Again, in all instances, the HBsAg prevalence varied positively with age.

The Hepatitis Vaccination Clinic of the Department of Health provides pre-vaccination screening for government health care workers in Hong Kong. Box 13 shows the prevalence of HBsAg+ in this population in 1999 and 2000. The positivity rate is much lower than in the earlier studies. It must be cautioned that this was a self-selected heterogeneous group. Before 1 Sep 2000, only existing health care workers were recruited on a voluntary basis for the programme and those who knew their HBsAg+ status may not attend for screening. From 1 Sep 2000 onwards, all newly employed health care workers were recruited for screening while existing health care workers were still recruited on a voluntary basis.

Box 13. Prevalence of hepatitis B markers in health care workers in 1999 and 2000 (Data source: DH)

| Year | No. tested for HBV markers | HBsAg + | |
|------|----------------------------|---------|-----|
| | | No. | % |
| 1999 | 138 | 3 | 2.2 |
| 2000 | 223 | 12 | 5.4 |

Risk behaviours and Hepatitis B markers

Unprotected sex and needle sharing (in injecting drug users) are known routes of HBV transmission. Three programmes offered data on hepatitis B infection in drug users, commercial sex workers and HIV-infected patients respectively i.e. the three groups of people that are more likely to have engaged in high risk behaviours for HBV transmission.

Drug users

One programme involved the monitoring of the pattern of hepatitis B markers in drug users who have registered with methadone clinics or drug rehabilitation service. Box 14 shows the prevalence of various Hepatitis B markers among drug users in the last 11 years. HBsAg positivity rate has gradually fallen from over 13% in 1990 to a nadir of 6.5% in 1997. However, the rate then increased again to about 11% in 2000. Generally speaking, hepatitis B markers were still detected in a large proportion of drug users.

Box 14. Prevalence of hepatitis B markers in drug users (Data source: Virus Unit, DH)

| Year | No. tested | % +ve | | | |
|------|------------|-------|----------|-----------|------------|
| | | HBsAg | Anti-HBs | Anti-HBc* | Any marker |
| 1990 | 1067 | 13.4 | 59.0 | 15.7 | 90.8 |
| 1991 | 1517 | 14.4 | 54.4 | 20.5 | 89.3 |
| 1992 | 827 | 14.0 | 49.3 | 21.5 | 84.9 |
| 1993 | 749 | 14.3 | 43.1 | 12.3 | 69.7 |
| 1994 | 616 | 12.7 | 37.5 | 13.0 | 63.1 |
| 1995 | 190 | 10.5 | 36.8 | 11.6 | 58.9 |
| 1996 | 363 | 8.8 | 42.4 | 12.9 | 62.3 |
| 1997 | 293 | 6.5 | 35.8 | 15.7 | 52.9 |
| 1998 | 292 | 9.9 | 42.8 | 8.9 | 59.2 |
| 1999 | 730 | 11.1 | 65.3 | 14.5 | 65.5 |
| 2000 | 902 | 11.8 | 44.0 | 16.5 | 70.3 |

* Specimens positive for HBsAg were not tested for anti-HBc

In the past, around 90% of drug users were positive for at least one of the three markers (HBsAg, anti-HBs and anti-HBc); this has dropped to 52.9% in 1997 and then slowly rose again to 70.3% in 2000. Readers must be cautioned that the number of drug users surveyed from 1995 to 1998 is small, and the data were collected from various sources over the years.

Co-infection with HDV has been reported in injecting drug users. Local data on HDV infection is lacking in recent years. In a report⁷ published in 1995, the prevalence of HDV has fallen from 63.1% of 149 HBsAg +ve injecting drug users in 1985-1986 to 28.8% of 153 HBsAg +ve injecting drug users in 1992-1993. There was a greater decline in infection rate in those with five or less years of history of illicit drug use compared with those on drugs for over 5 years. The decrease in HDV prevalence is probably related to a general fall in HBV carriage, an observation reported in other overseas studies⁸. No additional information on the pattern of HDV infection was published subsequently. Overall, epidemiological information on HDV in other population groups is scarce.

Female Commercial sex workers

From 1995 to 1998, the government Social Hygiene Service which provided free treatment for sexually transmitted diseases (STD), conducted a study to examine the prevalence of hepatitis B markers in female commercial sex workers in Hong Kong. The complete study had involved a total of 1020 female commercial sex workers recruited at one Social Hygiene Clinic on Kowloon side. The prevalence rate of the serological markers were: 69 (6.8%) positive for HBsAg; 551 (54.0%) positive for anti-HBs; and 400 (39.2%) negative for either. An analysis on 100 commercial sex workers was published⁹.

HIV-infected patients

Testing for HBV markers has been offered to clients attending the HIV clinic of the Department of Health. As HIV shared the same routes of transmission with HBV, it is not surprising to find a high HBsAg prevalence in HIV-infected patients - 15.4% in 1998 and 9.3% in 2000. (Box 15)

Box 15. HBsAg prevalence in HIV/AIDS patients in 1998 and 2000.
(Data source: Integrated Treatment Centre, DH)

| Year | Male | | Female | | Total | |
|------|------------|-----------------|------------|-----------------|------------|-----------------|
| | No. tested | No. HBsAg + (%) | No. tested | No. HBsAg + (%) | No. tested | No. HBsAg + (%) |
| 1998 | 140 | 22 (15.7) | 16 | 2 (12.5) | 156 | 24 (15.4) |
| 2000 | 87 | 9 (10.3) | 21 | 1 (4.8) | 108 | 10 (9.3) |

Composite data on HBsAg prevalence

Box 16 and 17 show the HBsAg data collected from various sources between 1990 and 2000. A general declining trend is evident. Comparison across datasets should be cautioned in view of the different methodology employed in the studies. Readers may refer to the report published in 1996, 1997 and 1999 for details of some of the data included in the composite table and graph.

Hepatitis B e antigen-negative chronic hepatitis B

A local study¹⁰ published in 2000 examined the features of e antigen-negative chronic HBV infection. Cross-sectionally, 69% (243/350) were HBeAg negative, of whom 15% had clinical cirrhosis and another 22% had elevated transaminases. Overall, 17 % of the HBeAg negative patients were viraemic and had evidence of chronic liver disease. Only 45% of the e Ag negative chronic hepatitis B patients were found to have pre-core stop codon mutation.

Box 16. HBsAg prevalence in different population groups in the last decade (1990 to 2000)

| Year | % HBsAg+ | | | | | | | | |
|------|------------------|--|-----------------------|------------------|-----------------|---------------------|------------|-------------------------------|-------------------|
| | New blood donors | University students/staff (aged 21-30) | Pre-marital screening | Ante-natal women | Police officers | Health care workers | Drug users | Female commercial sex workers | HIV/AIDS patients |
| 1990 | 7.97 | - | 9.6 | 11.3 | - | - | 13.4 | - | - |
| 1991 | 8.04 | - | 9.6 | 10.9 | - | 6.2 | 14.4 | - | - |
| 1992 | 7.38 | - | 9.3 | 10.8 | - | - | 14.0 | - | - |
| 1993 | 6.70 | - | 8.7 | 10.1 | - | 4.7 | 14.3 | - | - |
| 1994 | 5.88 | 3.5 | 7.3 | 10.0 | - | - | 12.7 | - | - |
| 1995 | 5.99 | 4.3 | 7.9 | 9.7 | - | 7 | 10.5 | 6.8 | - |
| 1996 | 5.57 | 3.9 | 7.9 | 9.7 | 6.1 | 4.2 | 8.8 | | - |
| 1997 | 5.30 | - | 7.6 | 9.3 | 7.9 | - | 6.5 | | - |
| 1998 | 4.89 | 3.5 | 6.8 | 9.0 | 7.4 | - | 9.9 | | 15.4 |
| 1999 | 4.44 | - | 6.7 | 8.8 | 6.4 | 2.2 | 11.1 | - | - |
| 2000 | 4.15 | 3.1 | 5.6 | 8.9 | 6.6 | 5.4 | 11.8 | - | 9.3 |

Box 17. Trends of HBsAg in selected population groups (1990 to 2000)



5. HEPATITIS C INFECTION

Anti-HCV seroprevalence

Hepatitis C is transmitted through parenteral route. One early study done locally in 1988 reported a prevalence of 0.5% in the general population and 66.8% in injecting drug users¹¹.

New blood donors

With the implementation of anti-HCV screening at the Hong Kong Red Cross Blood Transfusion Service, a regular source of epidemiological information has become available. Box 18 shows the anti-HCV prevalence in new blood donors, which ranged from 0.035% to 0.099% in the last ten years.

Box 18. Anti-HCV prevalence in new blood donors (Data source: HKRCBTS)

| Year | No. of new donors | Anti-HCV+ | |
|------|-------------------|-----------|-------|
| | | No. | % |
| 1991 | 48769 | 17 | 0.035 |
| 1992 | 43674 | 28 | 0.064 |
| 1993 | 36146 | 36 | 0.099 |
| 1994 | 38077 | 24 | 0.063 |
| 1995 | 39778 | 28 | 0.070 |
| 1996 | 40875 | 24 | 0.059 |
| 1997 | 40419 | 35 | 0.087 |
| 1998 | 43756 | 29 | 0.066 |
| 1999 | 40960 | 40 | 0.097 |
| 2000 | 41166 | 24 | 0.058 |

Drug users

Sera remaining from samples submitted to the Government Virus Unit from Methadone Clinics and in-patient drug rehabilitation centres were tested for HCV antibody. A comparison of the results obtained from samples in early 1990s and early 2000s showed an overall decline in prevalence in this 10-year period. (Box 19)

Box 19. Anti-HCV prevalence in drug users receiving treatment (Data source: Virus Unit, DH)

| Year | No. tested | Anti-HCV+ | |
|-----------|------------|-----------|------|
| | | No. | % |
| 1991/1992 | 134 | 99 | 73.9 |
| 2000/2001 | 210 | 97 | 46.2 |

HCV genotypes

As regards the genotyping of HCV in Hong Kong, a serotyping study among 212 blood donors who tested positive for anti-HCV in 1991 to 1994 provided very useful information¹². This study revealed that the commonest genotype was 1b (58.8%), followed by type 6a (27.0%). A significantly greater number of donors infected with type 6a reported a history of drug abuse, compared with those infected with type 1b. In western countries, type 1 is most commonly reported.

A comparison of the distribution of genotypes in the study in Hong Kong and another study in the United States¹³ is as follows:

| <u>Genotype of HCV</u> | <u>Hong Kong¹²</u> | <u>United States¹³</u> |
|------------------------|-------------------------------|-----------------------------------|
| 1a | 6.2% | 56.7% |
| 1b | 58.8% | 17.0% |
| 2a | 1.4% | 3.5% |
| 2b | 1.4% | 11.4% |
| 3a | 1.9% | 7.4% |
| 4 | - | 0.9% |
| 6 | 27% (6a) | 3.2% |

Another local study¹⁴ looking at renal failure patients and non-renal failure controls also showed the predominance of genotype 1b, followed by 1a and 6a.

| <u>Genotype of HCV</u> | <u>Renal failure (n=50)</u> | <u>Non-renal failure (n=26)</u> |
|------------------------|-----------------------------|---------------------------------|
| 1a | 10% | 4% |
| 1b | 78% | 69% |
| 2a | 2% | 4% |
| 2b | 4% | 4% |
| 4a | 2% | 0 |
| 6a | 8% | 19% |
| Mixed | 4% | 0 |

6. TRACKING HEPATITIS A AND HEPATITIS E

Both HAV and HEV are transmitted through faecal-oral route. The following is a compilation of the local sero-prevalence studies on HAV and HEV in Hong Kong over the past years.

Hepatitis A infection

Hepatitis A infections in the population are monitored through testing for serological markers. Total or IgG Anti-HAV is a marker for previous exposure to the virus; IgM anti-HAV is a specific marker for recent infection.

In the past, a number of studies had been conducted in Hong Kong to examine the seroprevalence of hepatitis A in the general population. Box 20 shows the results (% anti-HAV positive) of the collection of studies. Whereas about half (44.8%) of the adolescents and young adults developed anti-HAV when they reached the age of 11-20 in 1978¹⁵, this proportion dropped to 17.1% in 1987, 11.2% in 1989¹⁶, 11.1% in 1993¹⁷ and 7% in 1996¹⁸. Thus, there is suggestion of a right shift of the age-specific prevalence curve over the last two decades. However, as the populations and methodologies were different in the various studies, interpretation of the results must be cautioned.

Box 20. Prevalence of anti-HAV in a collection of studies between 1978 and 2000

| Age groups | 1978 | 1987 | 1989 | 1993 | 1995 | 1996 | | 1998 | 2000 |
|-------------|-----------------|-----------------|-----------------|------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 0 – 10 | 12.9% | 5.3% | 6.8% | 59.4% (M) 53.3% (F) | 8.3% | - | 6.1% | 5.4% | 9.3% |
| 11 – 20 | 44.8% | 17.1% | 11.2% | | 7.0% | | | | |
| 21 – 30 | 75.0% | 53.8% | 58.8% | | 11.3% | - | 11.8% | 7.6% | 17.5% |
| 31 – 40 | 82.9% | 85.1% | 83.5% | | 49.0% | - | 37.7% | 40.8% | 35.0% |
| 41 – 50 | 91.1% | 94.7% | 91.1% | 94.5% (M) | 70.5% | - | 58.6% | 66.7% | 60.0% |
| >50 | | | 93.9% | 91.0% (F) | | - | | | |
| Data source | A ¹⁵ | A ¹⁵ | B ¹⁶ | C ¹⁷ | D ¹⁹ | E ¹⁸ | F ²⁰ | G ²¹ | H ²² |

Data sources:

- A. Study on stored sera of 702 healthy subjects, by Chin et al of University of Hong Kong.
- B. Study on 1028 serum samples collected from individuals attending a health exhibition, by Lim et al of Department of Health.
- C. Seroprevalence results reported in the press by Lai et al of University of Hong Kong.
- D. Pre-vaccination screening on 553 students and staff on City University of Hong Kong.
- E. Seroprevalence study in school children by Lee A of the Chinese University of Hong Kong.
- F. Pre-vaccination screening on 669 students and staff on City University of Hong Kong
- G. Pre-vaccination screening on 608 students and staff on City University of Hong Kong.
- H. Pre-vaccination screening on 395 students and staff on City University of Hong Kong.

As evidenced from the notified cases, HAV is an important cause of acute viral hepatitis. The consumption of contaminated shellfish is one of the causes for the occasional Hepatitis A outbreak in Hong Kong. A recent study cited the experience of Tam JS, who reported the detection of HAV by RT-PCR in 6% of clams, 14% of mussels and 30% of oysters in winter. The corresponding figures for summer for clams and mussels were 0% and 26% respectively²³.

Hepatitis E infection

In Hong Kong, studies on the seroprevalence of HEV are limited.

A retrospective study published in 1992 reported that 16.1% of the healthy subjects were positive for anti-HEV²⁴. The age-specific prevalence increased with age, from below 10% in people aged below 20, to about 30% in those aged above 40.

Another study published in 1995 reported a prevalence of 18.2% in 77 healthy subjects in southern China²⁵.

7. CONCLUSIONS

In the process of compiling the update report series, the SWGVHP was given an opportunity not only to examine and discuss the hepatitis situation but also appraise the strengths and weaknesses of the existing surveillance mechanism regarding viral hepatitis in Hong Kong. The efforts have also brought a dedicated group of professionals together to develop consensus, and to recommend on prevention strategies and means of enhancing the existing surveillance system.

Patterns of viral hepatitis in Hong Kong

Hepatitis B

As in the last three reports, an obvious pattern observed in the 2000 update report is the decline of hepatitis B markers in almost all community groups studied over the past years. Whereas it is still customary to quote an HBsAg carriage rate of 10% in Hong Kong, evidence have emerged to support that it could be much lower.

It can be inferred that perinatal infection has been the commonest cause of HBV transmission, based on two factors:

- (a) High HBsAg prevalence in the general population and
- (b) High risk of becoming chronic carriers if infected during infancy.

With the universal neonatal hepatitis B vaccination programme in place since 1988, infection and carriage starting in childhood would continue to decline. There is a possibility that sexual contact may become the commonest mode of HBV transmission in the future. The high HBsAg prevalence among those aged below 15 in the recent three years (figures from FHS, box 9) must be interpreted with care. Firstly, the number of patients screened in this age group is small and secondly, they are at higher risk of contracting HBV infection because part of them were screened for HBV because of co-existing sexually transmitted disease. This highly biased data must not be used to imply that universal neonatal hepatitis B vaccination programme failed to protect this age group. Data from other sources should be gathered to evaluate the effectiveness of this programme on the HBV related morbidity and mortality.

Hepatitis C

Hepatitis C shares common transmission routes with hepatitis B. Worldwide, HCV prevalence and its main transmission routes vary from place to place. These may not be in synchrony with the HBV situation. The data from new blood donors suggest that it's between 0.035% to about 0.1% in young adults in Hong Kong, much lower than that of HAV, HBV and possibly HEV. Experiences of clinicians and virologists have previously confirmed that HCV was common in injecting drug users and haemophilia patients. Results of testing non-random samples from drug users under treatment suggested a decline in rate of HCV infection. There were epidemiological evidence that 1b was the commonest genotype in Hong Kong, unlike western countries.

Hepatitis A and E

The faecal-orally transmitted viral hepatitis, HAV and HEV, are likely to continue to be important causes of symptomatic infectious hepatitis. The declining level of HAV antibodies reflects the diminishing immunity of the population against the virus. More large-scale studies on the age-specific anti-HAV prevalence in Hong Kong are needed to address the possible diminishing immunity of the population against HAV. Such knowledge would be useful to help decide on the vaccination strategy for Hong Kong. The importance of HEV is less clear. It is one possible cause for acute hepatitis, while between 10% and 20% of the population may carry antibody against the virus, an indication of previous infection.

Other viral hepatitis

Local data on other parenterally transmitted viruses like HDV, and HGV are scarce. A meaningful conclusion cannot be drawn at this stage.

Limitations of existing surveillance mechanisms

The current statutory reporting is a regular monitoring mechanism for describing *acute* viral hepatitis. The system is useful in tracking symptomatic infections like hepatitis A and hepatitis E in adults but its usefulness in monitoring the other viral hepatitis is doubtful. Reporting of acute viral hepatitis serves little in depicting the epidemiology of hepatitis C infection because of the large proportion of asymptomatic infection and the difficulty in identifying acute infection. Generally speaking, although the disease notification system has remained a useful source of information for acute viral hepatitis over the years, its usefulness in assessing the burden of hepatitis infection in the community is limited.

On the other hand, serosurveillance plays a crucial and complementary role in the surveillance of viral hepatitis. In the last five years, the SWGVHP has been able to collect a wide range of data to help describe hepatitis epidemiology in Hong Kong. There are, however, problems in the use of the existing data sets. Many of these studies are not specifically designed to collect epidemiological data. Some are figures extracted from service activities or health promotion projects (for example, pre-vaccination screening in police officers, testing of drug users, antenatal testing of pregnant women). The ways they select subjects e.g. for administrative purposes generate bias if generalization is attempted. There are research projects that provide useful one-off epidemiological data. However, little information was provided on the longitudinal trends.

The Way Forward: Meeting future surveillance needs

Despite these shortcomings, a systematic approach to collate and analyze available data is a useful exercise for better understanding hepatitis epidemiology. However, in order to better reflect the hepatitis situation in Hong Kong, the current surveillance mechanism need to be enhanced.

Over the past few years, the SWGVHP has discussed means of enhancing the capacity of Hong Kong's surveillance mechanism on viral hepatitis. The main suggestions are:

- (a) Seroprevalence studies would need to be conducted regularly to track the changes over time.
- (b) A pilot surveillance system could be established to monitor the clinical and epidemiological patterns of hepatitis C.
- (c) Liver complications from chronic hepatitis infections shall be tracked to discern public health impacts on morbidity and mortality
- (d) Epidemiology of HBV mutant, and impacts of universal vaccination programme shall be tracked.

ACKNOWLEDGEMENT

The SWGVHP wishes to thank the following agencies for their input, suggestions or comments in the course of preparing the 2000 Update Report:

Government Virus Unit, Department of Health
Disease Prevention and Control Division, Department of Health
Special Preventive Programme, Department of Health
Family Health Service, Department of Health
Family Planning Association of Hong Kong
Hong Kong Red Cross Blood Transfusion Service
CHC-Group Medical Practice
Health Service of City University of Hong Kong
Princess Margaret Hospital

ABBREVIATIONS

| | |
|----------|---|
| AIDS | Acquired immune deficiency syndrome |
| Anti-HAV | Antibody against hepatitis A virus |
| Anti-HBc | Antibody against hepatitis B core antigen |
| Anti-HBs | Antibody against hepatitis B virus |
| Anti-HCV | Antibody against hepatitis C virus |
| Anti-HDV | Antibody against hepatitis D virus |
| Anti-HEV | Antibody against hepatitis E virus |
| CUHC | City University Health Centre |
| DH | Department of Health |
| FHS | Family Health Service |
| FPA | Family Planning Association |
| HBsAg | Hepatitis B surface antigen |
| HAV | Hepatitis A virus |
| HBV | Hepatitis B virus |
| HCV | Hepatitis C virus |
| HDV | Hepatitis D virus |
| HEV | Hepatitis E virus |
| HGV | Hepatitis G virus |
| HIV | Human immunodeficiency virus |
| HKRCBTS | Hong Kong Red Cross Blood Transfusion Service |
| IgG | Immunoglobulin G |
| IgM | Immunoglobulin M |
| IDU | Injecting drug users |
| ITC | Integrated Treatment Centre |
| MCH | Maternal and child health centre |
| PMH | Princess Margaret Hospital |
| RT-PCR | Reverse transcriptase – polymerase chain reaction |
| STD | Sexually transmitted disease |
| TTV | Transfusion transmitted virus |

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