

THE TRENDS AND RISK FACTORS FOR HEPATITIS B OCCURRENCE IN ESTONIA

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SUMMARY

Hepatitis B virus (HBV) infection is prevalent worldwide and is a significant cause of morbidity and mortality. This article describes the trend in HBV occurrence in Estonia from 1990 to 2005 in Estonia, with the aim of highlighting key determinants in transmission dynamics, risk groups, and possible implications for prevention and control.

A marked increase in reported numbers of new HBV cases occurred in mid 1990s (reaching 39 per 100,000 population) and decline thereafter. We present data on HBV prevalence from different population groups (persons with verified sexually transmitted infection, prisoners, medical personnel, blood donors and injection drug users). Special vaccination programmes introduced in Estonia have been successful in the prevention of HBV, however, we suggest that the main risk groups such as injection drug users (IDUs), men having sex with men (MSM) and HIV infected persons should be actively encompassed into HBV vaccination programme.

Key words: hepatitis B, epidemiology, HIV, IDU, Estonia

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INTRODUCTION

Hepatitis B virus (HBV) infection is a major global public health problem. There are approximately 2 billion people who have been infected worldwide, and more than 350 million of them are chronic carriers of HBV (1). Approximately 15–40% of infected patients will develop cirrhosis, liver failure or hepatocellular carcinoma (2, 3). HBV infection accounts for 500,000 to 1.2 million deaths each year (4, 5) and is the 10th leading cause of death worldwide. Hepatocellular carcinoma incidence has increased worldwide, and the disease is now the 5th most frequent cancer, killing 300,000–500,000 people each year (6, 7).

The occurrence of HBV infection varies markedly in different geographic areas of the world, as well as in different population subgroups. According to the WHO data in 2005 the average number of HBV cases per 100,000 population was 3.1 in the European area with the highest incidence recorded in Iceland (13.8/100,000) and the lowest one in Finland (0.69/100,000). HBV can be transmitted perinatally, acquired during the preschool years or by horizontal transmission in early adult life, i.e. through intravenous drug use or unprotected sexual activities (8). Other sources of infection include contaminated surgical instruments and donor organs. Health care workers, dentists and others who have frequent contact with infected blood or blood products are at highest risk. Clinically and epidemiologically relevant co-infections of HBV are described with the HCV and HIV (9). Most studies show that HIV infection leads to more aggressive hepatitis C or hepatitis B and higher risk of liver

diseases, and co-infection can complicate treatment. People with liver damage due to chronic hepatitis are more likely to experience hepatotoxicity related to anti-HIV drugs (10).

In addition to IDUs, prisoners and sex workers, also MSM (men having sex with men) are considered as a high risk group for HBV infection. Several studies indicate that homosexual relationships of men will significantly contribute to the HBV infection risk (11, 12, 13). For instance, a study conducted in United States reported the 11% average prevalence of HBV serological markers among MSM aged 15 to 22 years (14).

Hepatitis B viral infection is a preventable disease. A safe and effective vaccine, which has been available for more than 20 years, is 95% effective in preventing the development of chronic infection. In 1991, the World Health Organization (WHO) recommended adding HBV vaccination to all national immunization programmes (1). The disease burden of HBV can be substantially reduced with public health interventions and the implementation of vaccination programs.

Estonia is confronted with an HIV epidemic driven by injection drug use that has led to the highest increase in incidence of HIV infections in Europe (increase from 7.2 per million in 1998 to 504 in 2005) (15). In 2006, Estonia had the highest incidence of HIV in Europe with a rate of newly reported HIV cases of 49.7/100,000 inhabitants, which is about twice the rate of 27.5/100,000 inhabitants in Russia (16).

The current study sought to review the epidemiology of HBV infection in Estonia for the period of 1995 to 2005.

METHODS

We made a review of the published literature and routine data sources available:

1. *Nationwide passive surveillance system of infectious diseases (17):*

In Estonia, surveillance of selected infectious diseases (HBV, HIV, HCV included) is based on the mandatory universal notification of newly identified cases to the Health Protection Inspectorate (HPI) with the same reporting principles in force throughout the last decades.

2. *Database of Ministry of Social Affairs on health care statistics (18):*

The Health Statistics Unit of the Department of Health Information and Analysis at the Ministry of Social Affairs of Estonia routinely collects health care statistics from all health care providers in the country.

Some unpublished reports and studies have been used.

RESULTS

Epidemiology

In the early 1990s there was a marked increase in the incidence of registered cases of HBV (and HCV). Between 1994 and 1997, there was an almost five-fold increase in the absolute numbers of people infected with hepatitis B and C. Those affected were young: among the registered new cases in 1997, 50% of those diagnosed with HBV and 52% of those diagnosed with HCV were 15–19 years old, and with higher incidence among men (19).

The highest number of registered incidences of HBV was reported for the year 1997, 39/100,000 (16) (Fig. 1). In the early 2000s the incidence of HBV has decreased considerably – from 17.8 in 2002 to 5.8 in 2005, and 3.3 per 100,000 in 2007 (17).

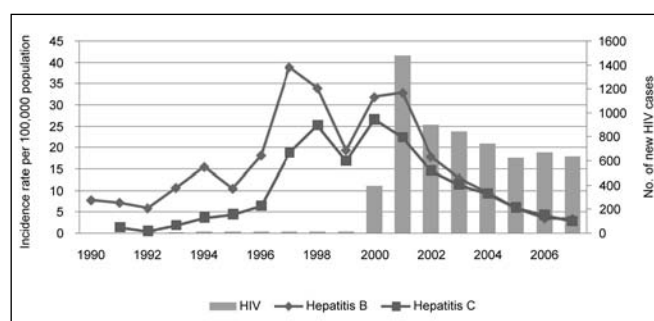


Fig. 1. Incidence of HBV and HCV infection and absolute numbers of HIV cases in Estonia, 1990–2007.

Data source: Health Protection Inspectorate, WHO database (16, 17)

Already before 1990s the share of incidence of HBV cases attributable to blood transfusion and medical procedures had significantly declined and continued to do so in the early 2000s (the proportion of new HBV cases related to transfusion or other medical procedures was about 80% in 1980s, 9% in 1990s, and 3–4% by mid 2000s (17, 20).

It is speculated that the recent increase in the incidence of HBV (and HCV) was attributable to the spread of injecting drug use in Estonia (21–23). The epidemic of IDU preceded epidemics of HBV (and HCV, HIV). The first reports describing IDU outbreak and the growing size of IDU population in Estonia are based on field reports and expert opinions (21). In addition, growing drug use accompanied by the markedly increased numbers of patients treated for psychiatric and behavioural disorders caused by the use of illegal drugs, has more than tripled during the 1990s (from 24.5/100,000 in 1995 to 82.2/100,000 in 1998) (24), as well as the number of patients admitted for use of illicit opioids and alcohol during the early part of past decade (25). Majority of persons diagnosed with HBV infection among persons aged 15–19 and 20–29 years from 2002 to 2005 were IDUs (19, 26).

We were able to compile several research and administrative reports presenting HBV prevalence estimates from the period of 1990 to 2005 in certain population groups (Table 1). The lowest prevalence of HBV (0.1%) was reported among blood donors in Estonia. In Estonia, donating blood is voluntary and unpaid, and blood donors are actively pre-screened. Among the 189 patients with verified STIs (*C. trachomatis*, *N. gonorrhoea*, *T. pallidum* infections) enrolled between 1996 and 1998 in Tartu (the second largest town in Estonia) the prevalence of HBsAg was 1.6%, anti-HBc 11.9%, and anti-HCV 2.7%. The age of all participants in the study ranged from 18–43 (with mean = 25.6, SD 5.5), the proportion of women was 53.4% (27). L. Priimägi et al. reported that 22% (HBV core antibodies prevalence) of the health care workers (physicians, nurses from infectious diseases, pediatrics' and surgery clinics) in Tallinn had HBV. Several studies have reported about high rates of HBV among IDUs in Estonia (28). A study that collected data on 162 IDUs visiting needle and syringe exchange programmes (NSPs) in 2004 documented high prevalence of HIV, anti-HBc, HBsAg and anti-HCV antibodies (56%, 85.1%, 21.3%, and 96%, respectively) coupled with high levels of risky injection, unsafe sexual behaviour and alcohol abuse (29). Very high HBV/HIV/HCV co-infection rates were reported. For instance among the imprisoned IDUs, the prevalence of co-infection HBV/HCV was 88.5% (28).

Molecular Epidemiology

The genetic analysis of Estonian HBV virus strains revealed that genotype A, subtype *adw2* (14%) and genotype D, subtype *ayw3* (73%), subtypes *ayw2* (3%) and *ayw4* (9%) are circulating in Estonia (30). Infection with genotype D was mainly associated with IDUs, sexual contacts and medical procedures.

Prevention

In Estonia, the vaccination for HBV is free of charge for some population groups including health-care workers (from 1997), teenagers (from 1999) and newborns (from 2003). At the end of 2003 vaccination coverage for newborns was 46%. Since 2006, the coverage of newborns up to the age of two has reached 96.3% (31).

DISCUSSION

We have presented an overview on HBV epidemic in Estonia. In reality a process as a complex of integrated epidemics, driven

Table 1. HBV prevalence in selected population groups

Author	Years of study	Population group	Number of study subjects	The prevalence of the blood-borne infection markers tested			
				HBsAg	HBcore	HCV	HIV
Priimägi L. (28)	1995–1997	health care workers	510	2.6%	22.3%	3.9%	NTa
Paat G. (27)	1996–1998	STI patients	189	1,6%	11,9%	2,7%	NT
Priimägi L. (28)	1996–2000	imprisoned IDUs	237	12.6%	82.3%	93.7%	Neg
Tefanova V. (19)	2002–2003	prisoners ^b	122	9.8%	89.3%	100%	
		anonymous testing, IDU, Tallinn ^c	63	6.3%	68.2%	1.6%	
		anonymous testing, IDU, North-east county ^d	37	5.4%	59.5%	40.5%	
Uusküla A. (29)	2004	IDUs	159	21%	85%	96%	56%
Plahhova T. (46)	2006	blood donors	32254	0.08%	NT	0.22%	0.03%

^aNT – none tested

^bImprisoned IDUs from Tallinn Central Prison, all HIV-positive

by social, behavioural and biological factors following the rapid change in social structure of the country have taken place in the period of 1990–2005. Little attention was paid to the developing IDU epidemic in Estonia in early 1990s, and the epidemic of HBV, HCV that followed in the middle and late 1990s. It is also important to note that an explosive epidemic of bacterial STI (especially syphilis) took place in the early and middle 1990s (32), being most likely the marker of underlying epidemic of high risk sexual behaviour (bearing in mind the importance that neither testing and diagnosing nor system of communicable diseases notification changed in those years). The HIV epidemic that exploded in early 2000s (33) was detected quickly and public health response evolved. Major changes in political, economic and social structure have lead to significant changes in behaviour (increases in risk taking and drug abuse) that eventually contributed to the emergence of infectious diseases epidemics.

Very similar changes in occurrence of infectious diseases (blood-borne infections, sexually transmitted infectious, tuberculosis) have been described and documented from several transitional countries from the region (34–38). This is pertinent also to the data on HBV trends. The increase of reported incidence at the end of 1990s and a clear downward trend in 2000s are reported from Russian Federation, Latvia (16). Part of the decline in incidence of HBV can be attributable to more efficient vaccination programmes in place (vaccination of youth).

The recent HIV, HBV and HCV epidemics have been attributed to the spread of injection drug use in Estonia. According to the estimates, there were 14,000 IDUs in Estonia in 2004, which translates into a prevalence of 2.4% among people aged 15–44 years (39), and close to half of them are HIV-infected (40, 41). In addition, the prevalence of HIV/HBV/HCV co-infections among IDUs is extremely high.

HBV infection is a well-recognized occupational risk for healthcare workers. Data on professional exposure to potentially infectious material among health care personnel from Estonia is very limited. The HBV prevalence among health care workers

documented by L. Priimägi et al. (28) was surprisingly higher than those reported among patients with verified STI infection from the same time period. The study designs, aims and data collection sites of those studies were importantly different and results therefore are not directly comparable. Still, the prevention of transmission of blood borne pathogens, including HBV, from patients to healthcare workers and from healthcare workers to patients in Estonia requires full attention and further assessment. Interventions like administering hepatitis B vaccine to all susceptible healthcare workers at risk, adherence to standard (universal) precautions, appropriate cleaning and disinfection procedures, safe injection practices require urgent implementation.

Findings from studies conducted in Estonia describe high rates of sexual risk behaviour and inadequate knowledge regarding prevention of disease transmission (42), emphasizing the threat of an impending sex-related HIV and viral hepatitis epidemics. The groups under immediate threat are IDUs and their sexual partners. Moreover, also MSM are generally considered as a critical risk group for HBV infection (13).

However Estonia lacks adequate and reliable data about the prevalence of HBV infection among MSM. Still, a related study that sought to look into HIV/AIDS related knowledge and behaviour among MSM visiting gay websites found that only 37% of MSM do not practice any risky sexual behaviour and about 21% of MSM can be characterized as exhibiting highly risky sexual behaviour (43). Hence including MSM into prevention and vaccination programmes of HBV may also be taken into consideration in Estonia.

The current HBV vaccination schedule in place is targeting infants and teenagers. The highest risk of infection, and hence being the target groups, is bared by: 1. injection drug users, 2. their sexual partners and 3. eventually family members.

Given that liver disease due to chronic HBV and HCV infection is becoming a leading cause of death among persons with HIV infection worldwide (44) the implementation of specific prevention interventions (such as targeted HBV vaccination of

IDUs) and accessible treatments for HBV and HCV infection is of utmost importance in the management of those at risk for these infections and for prevention of long-term sequel such as liver disease (45). In any case, the future burden on health systems and economic productivity may well be enormous.

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