

SEXUALLY TRANSMITTED INFECTIONS AMONG PROSTITUTES IN BRATISLAVA, SLOVAKIA

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Summary. – Sera from 18 prostitutes from Bratislava were examined for the presence of antibodies to several sexually transmitted pathogens, namely Herpes simplex virus 2 (HSV-2), Human immunodeficiency viruses 1 and 2 (HIV-1 and HIV-2), Hepatitis B and C viruses (HBV and HCV), *Chlamydia trachomatis*, and *Treponema pallidum*. Results of this screening indicated that 11 prostitutes (61%) carried 1 or more sexually transmitted infections. The most prevalent antibodies were directed against HSV-2 (9 cases, i.e. 50%), which represents the most common sexually transmitted infection agent.

Key words: Herpes simplex virus 2; Human immunodeficiency viruses 1 and 2; Hepatitis B virus; Hepatitis C virus; *Chlamydia trachomatis*; *Treponema pallidum*; prostitutes; antibodies

Introduction

Viral and bacterial sexually transmitted diseases (STDs) have been recognized as a major public health problem for a number of years. Sexually transmitted pathogens infect primarily the reproductive tract as their primary site with transmission occurring during sexual intercourse or from mother to child during pregnancy and childbirth. As a result, the greatest risk of infection occurs among sexually active people and infants born to infected mothers. Women have been reported to have higher rates of infection with STDs than men, particularly prostitutes and the women with multiple sex partners (Janier *et al.*, 2000). Despite medical advances in recent years, STDs continue to be an important

cause of morbidity and mortality throughout the world (Gerbase *et al.*, 1998).

Epidemiological trends of STDs are markedly different in various parts of the world. In Northern and Western Europe there has been a great decline in the incidence of STDs, particularly syphilis. The situation in Northern America is far more complex. There are geographic regions having low levels of STDs, followed by others continuing to experience epidemics of STDs. In developing countries the prevalence of STDs is still very high and STDs including HIV-1 and 2 represent a major public health problem (Piot and Islam, 1994).

More than 30 bacterial, viral and parasitic diseases have been now identified that can be transmitted by sexual route. However, only a minority of them use sexual transmission as their dominant route of spread. Among these infections the most serious are viral infections with HSV-2, HBV, HIV-1 and 2, bacterial infections with *T. pallidum*, *Neisseria gonorrhoeae*, *Hemophilus ducreyi* and chlamydial infections. An important factor in STD epidemiology is the interaction between HIV-1 and/or HIV-2 (HIV-1/2) and STDs. The latter, particularly those associated with genital

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Abbreviations: ELISA = enzyme-linked immunosorbent assay; HSV-2 = Herpes simplex virus 2; HIV-1,2 = Human immunodeficiency viruses 1 and 2; HIV-1/2 = HIV-1 and/or HIV-2; HBV = Hepatitis B virus; HBsAg = HBV surface antigen; HCV = Hepatitis C virus; STD = sexually transmitted disease

ulceration, increase the risk of sexual transmission of HIV-1/2 (Hook *et al.*, 1992; Dickerson *et al.*, 1996; Bystrická *et al.*, 1998).

The objectives of this preliminary study were to determine the incidence of STDs in a group of 18 prostitutes in Bratislava, Slovakia. The collected sera were tested for the presence of antibodies to HSV-2, HIV-1/2, HCV, *C. trachomatis*, *T. pallidum*, or markers of HBV infection.

Materials and Methods

Sera. Sera from 18 prostitutes were collected at the National Reference Center for AIDS/HIV Prevention in Bratislava, Slovakia.

Antibodies to HIV-1 and HIV-2. Each serum was tested twice by standard enzyme-linked immunosorbent assay (ELISA, Abbott Laboratories or Sanofi Diagnostics Pasteur) for the presence of HIV-1 and HIV-2 antibodies. ELISA-positive sera were subsequently tested by a Western blot assay (HIV Western Blot, Murex).

Antibodies to HSV-2. All procedures used in detecting antibodies to HSV-2 have been described in details elsewhere (Bystrická *et al.*, 1998).

Markers of HBV and HCV infections. The presence of HBsAg in sera was determined by ELISA (BIORAD Monolisa Ag HBs Plus). HCV antibodies were assayed by ELISA (MUREX anti-HCV version 4.0).

Antibodies to *C. trachomatis* were determined by an indirect immunoperoxidase assay (IPAzyme Chlamydia, Savyon, Israel).

Antibodies to *T. pallidum* were assayed by a rapid plasma reagin test for detecting non-specific antibodies (Sevapharma, Czech Republic) and by a passive particle agglutination test for detection of specific antibodies to *T. pallidum* (Serodia-TPPA, Fujirebio).

Results and Discussion

The collected sera from 18 prostitutes were tested for antibodies or markers related to viral (HSV-2, HIV-1 and 2, HVB, and HCV) and bacterial (syphilis, chlamydia) infections.

Specific HSV-2 antibodies were detected by Western blot analysis and their presence in sera was defined as reactivity to glycoprotein gG-2. In this study the seropositivity for HSV-2 was found in 9 cases, e.g. in 50% of collected sera (Table 1). This value is 4.5 times higher than that for the general population of Slovakia (Bystrická *et al.*, 1998). Even higher prevalence of HSV-2 antibodies among prostitutes has been found in some countries of America, Asia or Africa. In the United States and Mexico the detected seropositivity was 80%, in Asia 76%, and even higher, from 60% to 95%, in Africa (Nahmias *et al.*, 1990; Dada *et al.*, 1998; Limpakarnjarat *et al.*, 1999; Conde-Glez *et al.*, 1999). Reasons for such a high seroprevalence of HSV-2 antibodies among prostitutes include besides a high risk sexual behavior also other factors like a higher efficiency of HSV-2 transmission from men to women (Mertz *et al.*, 1992), low

Table 1. Prevalence of antibodies to HSV-2, HIV-1/2, HCV, *C. trachomatis*, *T. pallidum* and HBsAg in sera of prostitutes

Serum No.	HBsAg	HCV antibodies	HSV-2 antibodies	Antibodies to <i>T. pallidum</i>	Antibodies to <i>C. trachomatis</i>	HIV-1 antibodies	HIV-2 antibodies
337	-	-	-	-	-	-	-
367	+	-	-	-	-	-	-
635	-	-	-	-	-	-	-
636	+	-	-	-	+	-	-
637	-	-	-	-	-	-	-
638	-	-	-	-	-	-	-
639	+	-	+	-	-	-	-
713	-	-	-	-	-	-	-
786	-	-	+	-	-	-	-
824	-	-	-	-	-	-	-
875	-	-	+	-	-	-	-
923	-	-	+	-	-	-	-
924	-	-	+	-	-	-	-
925	-	-	-	-	-	-	-
975	-	-	+	+	-	+	-
1036	+	-	+	-	-	-	-
1037	-	-	+	-	-	-	-
1038	-	-	+	-	+	-	-
Total	4 cases	0 case	9 cases	1 case	2 cases	1 case	0 case
18 cases	(22.2%)	(0%)	(50%)	(5.6%)	(11%)	(5.6%)	(0%)

(+), (-) = positive, negative.

socioeconomic status, poor health-related behavior and drug abuse (Anderson and Dahlberg, 1992; Bryson *et al.*, 1993).

The presence of HIV-1 and HIV-2 antibodies in the sera was tested first by standard ELISA and then, in the case of positivity, by Western blot analysis. We detected only one serum positive for HIV-1 antibodies (Table 1). This frequency is quite comparable with that of HIV-1 and HIV-2 antibodies in other European countries, namely from 0% to 1.3% (Ward *et al.*, 1999). Such a seroprevalence range is quite moderate as compared with that in some countries of Asia and Africa, where it is 32% or even higher (Limpakarnjarat *et al.*, 1999; Nzila *et al.*, 1991; Gray *et al.*, 1997; Dada *et al.*, 1998).

Undoubtedly, low incidence of HIV-1/2-positive prostitutes is caused by the fact that Slovakia belongs to the countries with lowest incidence of HIV-1/2 infections in Europe with 1 new case per million inhabitants reported in 2001 (Semaille *et al.*, 2003). The individual in our group positive for HIV-1 antibodies was also positive for antibodies to HSV-2 and *T. pallidum*, the ulcerative STD. Recent studies have shown that having ulcerative or even non-ulcerative STD increases the risk of acquiring or transmitting HIV-1/2 approximately 3–5-fold (Wasserheit, 1992; Clotey and Dallabetta, 1993; Laga *et al.*, 1993). Moreover, the presence of HSV-1/2 infection may be involved in stimulating HIV-1/2 replication, resulting in progression to the AIDS. Hence, the detection and treatment of STDs causing inflammation or genital ulcers is very important in an effort to minimize the transmission of HIV-1/2 (Severson and Tyring, 1999; Wald and Link, 2002).

The presence of HBsAg was found in the sera from 4 prostitutes. This finding indicates that an infection with HBV, either acute or chronic, was present in 22% of study participants (Table 1). This value is very high, when compared with the prevalence of HBV at high-risk groups of population in other European countries. The prevalence of HBsAg carriers among prostitutes in Western and Northern Europe varies from 1% to 5% (McDonnell *et al.*, 1998; Bratos *et al.*, 1993). This difference may reflect different vaccination policies in many countries for the people at risk or for general population which is very effective and leads to long-term protection (Leroux-Roels *et al.*, 2001; Francois *et al.*, 2002). Serological surveys have documented that HBsAg carrier rates are different in various parts of the world with higher rates being reported from China, Africa and Middle East (5–20%). However, certain groups of population inside low incidence countries, who are sexually promiscuous, homosexual or intravenous drug users, have a higher rate of HBV infections. In the United States, the HBsAg carrier rate is less than 0.1% in general population, but the prevalence among prostitutes in the United States is 2.8% (Rosenblum *et al.*, 1992). In the developed countries most cases of HBV infection are

acquired through heterosexual or homosexual intercourse and through needle sharing by intravenous drug users (Alter *et al.*, 1990). In heterosexuals this risk rises with an increasing number of sex partners (Rosenblum *et al.*, 1990). Our results of screening prostitutes support the importance of heterosexual transmission of HBV infection in promiscuous women. We suggest that high-risk populations like prostitutes and homosexuals should be considered candidates for vaccination against HBV (Hadler, 1990; Mak *et al.*, 2003).

Besides parenteral exposure by blood and blood products, sexual transmission of HCV has been implicated among prostitutes and homosexual men (Lissen *et al.*, 1993). For that reason, we tested the collected sera also for the presence of HCV antibodies, but we did not find any positive. This negative finding is not surprising, because HCV can be sexually transmitted with low efficiency (MacDonald *et al.*, 1996).

For detection of treponemal antibodies in the collected sera, the presumptive rapid plasma reagin test and confirmatory treponemal passive particle agglutination tests were used. We found that only one serum was positive in both tests, what proved that the individual had an active syphilis (Table 1). The number of syphilis-positive prostitutes in Slovakia is still low, in spite of the fact that in countries of Central and Eastern Europe, this disease is on rise. In Latvia and other countries of former Soviet Union the active syphilis prevalence among prostitutes is between 13% and 16% (Kurova *et al.*, 1998; Chaplinkas and Mardh, 2001), and a similar seroprevalence has been found in Bulgaria and other countries of Eastern and Southern Europe. In Asia, South America and Africa, the seroprevalence among prostitutes varies from 4% to 32% (Limpakarnjarat *et al.*, 1999; Dada *et al.*, 1998; Rahman *et al.*, 2000). On the other hand, in developed countries of Western Europe, North America and Australia the prevalence of active syphilis among prostitutes is much lower, only 2.3% (Ward *et al.*, 1999). Although the incidence of syphilis in general population of Slovakia is still low, namely 1.7 cases per 100,000 inhabitants (Hegyí *et al.*, 1998), it remains an important public health problem especially in communities with low socioeconomic status. Recently, in some regions of Eastern Slovakia, the incidence of syphilis began to increase steeply in gypsy communities due to poor hygiene conditions. This year the rate of syphilis rose 20 times in some regions. The screening of people at risk for syphilis infection has many benefits. The infected people diagnosed at early stages of syphilis can be properly treated and the period during which they can transmit the disease to others can be effectively reduced (Garnett *et al.*, 1997). It has been shown that syphilis, due to the genital ulcers it produces, is a cofactor for acquiring other agents of STDs such as HSV-2, HBV and HIV-1/2. Thus prevention programmes need to

be strengthened especially among prostitutes and gypsy people (Rosenblum *et al.*, 1992).

Antibodies to *C. trachomatis* were detected by indirect immunoperoxidase assay specific for IgG and IgA antibodies. We detected two sera (11%) positive for the presence of IgG antibodies suggesting a previous contact with sexually transmitted *C. trachomatis* (Table 1). IgA antibodies were not detected in these two sera, implying that none of these patients experienced a chronic chlamydial infection. The results show the same seroprevalence for *C. trachomatis* as those of a control group of female blood donors in Slovakia (Kazár *et al.*, 1987). These values have to be considered with caution, because only a limited number of sera have been tested. In the neighbor Czech Republic the seroprevalence found among prostitutes in northern and central part of the country was considerably higher, namely 23% (Kačena *et al.*, 2001). In the countries of Western Europe a similar seroprevalence as in Slovakia has been detected (4–11%, Ward *et al.*, 1999; Scott *et al.*, 1995; Stary *et al.*, 1991). A much higher prevalence of chlamydial infections has been found in some countries of Latin America, Asia and Africa (11–33%, Uribe-Salas *et al.*, 1997; Rahman *et al.*, 2000; Sturm-Ramirez *et al.*, 2000). Chlamydial infection is by far the most common bacterial STD in Europe and North America and women suffer mostly from the consequences of this infection. Primary infection is usually symptomless. When left untreated, however, the infection may spread upwards from the lower reproductive tract and lead to pelvic inflammatory disease, chronic pelvic pain, infertility and other burden (Gerbase *et al.*, 1998; Kirchner and Emmert, 2000). Moreover, the infection with some serotypes of *C. trachomatis* seems to contribute to the development of invasive squamous-cell carcinoma of the uterine cervix (Koskela *et al.*, 2000). Monitoring the prevalence of *C. trachomatis* infection in prostitutes and sexually active women is very beneficial, because the chlamydial infection can be treated effectively with appropriate antibiotics.

The results of this preliminary study indicate that 11 prostitutes (61%) were diagnosed with one or more STDs. From 18 individuals tested 50% were positive for HSV-2, 22% for HVB, 11% for *C. trachomatis* and one for both HIV-1 and *T. pallidum*. These results should be regarded as preliminary, because only a very limited number of sera was tested. In spite of this flaw the obtained results show that the prevalence of STDs observed was comparable to other European countries. Nevertheless, the control of STDs and regulation of the commercial sex in Slovakia should become a public-health priority. Prostitutes and people with risky sexual conduct should be encouraged to modify their sexual behavior and to adopt safer sexual practices. Prevention programmes providing prostitutes with adequate contraception, clinical examination and therapy should be accessible to all (Gerbase *et al.*, 1998).

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