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·Review·

Global epidemiology of sexually transmitted diseases

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Abstract

Sexually transmitted diseases (STDs) are among the first ten causes of unpleasant diseases in young adult males in developing countries and the second major cause of unpleasant diseases in young adult women. Adolescents and young adults (15–24 years old) make up only 25% of the sexually active population, but represent almost 50% of all new acquired STDs. In general, STDs are epidemics and present an enormous health and economic consequences. An adequate screening for STDs should be done on a routine basis in every part of the world. Many STDs are asymptomatic and therefore can difficult to control. The purpose of reporting of STDs is to ensure that persons who are infected will be quickly diagnosed and appropriately treated to control the spread of infection and also so that partners are notified, tested and appropriately treated. It is estimated that reported cases of STDs represent only 50%–80% of reportable STD infections in the United States, reflecting limited screening and low disease reporting. High-risk sexual behavior is a highly contributive factor of this process as it often leads to teenage pregnancies and HIV/AIDS. One possible explanation for this behavior is that people do not have enough information about the transmission of STDs or ignore the precautions required for safe sex. Approximately 60% of new HIV infections worldwide occur in young people. The frequency of high-risk behaviors among youths may also be influenced by opportunity to engage in them, particularly the amount of time that they are unsupervised by adults. However, in diagnosing and treating these patients, we can effectively prevent the spread of HIV/AIDS. Individuals infected with STDs are 5–10 times more likely than uninfected individuals to acquire or transmit HIV through sexual contact. The breaking of the genital tract lining or skin creates a portal of entry for HIV and, hence, HIV-infected individuals with other STDs are more likely to shed HIV in their genital secretions. To date, the condom is the most effective method available for males for protection against STDs. It is important to control STDs, and prevention can be the key of this process. Prevention can be achieved through education of the population, identification of symptomatic and asymptomatic people, and effective diagnosis and treatment of these patients and their partners. *(Asian J Androl 2008 Jan; 10: 110 –114)*

Keywords: sexually transmitted diseases; safe sex; condom; young people

1 Introduction

Sex is life, but we have to be conscious of the fact that safe sex is the first premise. Sexually transmitted diseases (STDs) are among the first ten causes of unpleasant diseases in young adult males in developing countries and the second major cause of unpleasant diseases in young adult women worldwide. Adolescents and young adults (15–24 years old) are responsible for only 25% of the sexually active population, yet they represent almost 50% of all newly acquired STDs [1]. In general, STDs are epidemics and present enormous health and economic consequences [2].

The data regarding incidence and prevalence of STDs are heterogeneous. The prevalence of Chlamydia trachomatis infection in young females attending STD clinics in 1997 and 2005 are 12.2% and 15.4%, respectively, and 15.7% and 20.5% for young males [3]. However

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the incidence of gonorrhea is decreasing. In 1997, the reported prevalence of gonorrhea was 123 per 100 000 people, but by 2005 it had decreased to 115.6 per 100 000 people [3]. Syphilis data for men and women show statistical differences; the incidence of infection was 3.8 cases per 100 000 men in 2002 and 5.1 cases per 100 000 men in 2005. However, there were 1.1 cases per 100 000 women in 2002 and 0.9 cases per 100 000 women in 2005 [3].

An adequate screening for STDs should be done on a routine basis in every part of the world. Many STDs are asymptomatic and thus can difficult to control. The purpose of reporting of STDs is to ensure that those are infected will be quickly diagnosed and appropriately treated to reduce spread of infection that partners are notified, tested and appropriately treated [4]. It is estimated that reported cases of STDs represent only 50%–80% of reportable STD infections in the United States, reflecting limited screening and low disease reporting. We have known for some time that 60% of patients who have one STD will concurrently harbor another [5]. There are known risk factors associated with acquisition of STDs, including biological and behavioral factors, cultural influences, lack of information about transmission and contraction of STD, difficult to access prevention services, lack of adult supervision and number of sexual partners [6].

High-risk sexual behavior is a highly contributive factor of this process as it often leads to teenage pregnancies and HIV/AIDS. This behavior could occur because people do not have enough information about transmission of STDs or because they ignore the precautions required for safe sex. Approximately 60% of new HIV infections worldwide occur in young people. The frequency of high-risk behaviors among youths may also be influenced by opportunity to engage in them, particularly the amount of time that they are unsupervised by adults. Boys who were unsupervised for more than 5 hours per week after school were twice as likely to have Chlamydia or Gonorrhea as boys who were unsupervised for 5 or fewer hours. Nowadays, the sexual behavior of travelers, especially international travelers, could modify the risks of STD transmission too [7], because they can transfer some diseases form.

Another important issue is that male circumcision is associated with lower risk of STDs as well as HIV transmission [8]. This advantage was first described in 1855 [9] and the indication of this surgical intervention could provide protection against STDs and lead to a lower worldwide prevalence.

2 Chlamydia trachomatis

Genital *Chlamydia trachomatis* infection is one of the most prevalent STDs and is the most frequently reported STD in the United States [3]. The last 5 years have seen an increasing rate of infection (43.5%) and it is more common in women than in men (3:1). Infection with *Chlamydia trachomatis* may result in urethritis, epididymitis, cervicitis, acute salpingitis, or other syndromes. However, the infection is often asymptomatic in women and could result in pelvic inflammatory diseases (PIDs), one of the major causes of infertility [3], once in some cases the patients stayed without any kind of treatment. There is a high prevalence of co-infection (50%) in patients with *Chlamydia trachomatis* [10].

As with other inflammatory conditions, infection with chlamydia could facilitate HIV infection. Chlamydia can be transmitted to the neonates during delivery by an infected pregnant woman [3]. Due to its magnitude, the Center for Disease Control and Prevention (CDC) recommends chlamydia screening for all sexually active women less than 26 years old [2]. The benefits of screening could be demonstrated in areas where the prevalence of infection and rates of PIDs are decreasing since the screening programs began [11, 12]. Evidence is insufficient to recommend routine screening for *Chlamydia trachomatis* in sexually active young men, based on feasibility, efficacy, and cost-effectiveness. However, screening of sexually active young men should be considered in clinical settings with a high prevalence of chlamydia (e.g., adolescent clinics, correctional facilities, and STD clinics) [2].

3 Gonorrhea

Gonorrhea is a sexually transmitted infection commonly manifested by urethritis, cervicitis, and/or salpingitis. It is the second most commonly reported STD in the United States [3] and an estimated 600 000 new *Neisseria gonorrhea* infections occur each year [13]. Gonorrhea rates in women are slightly higher than in men. The majority of urethral infections caused by *Neisseria gonorrhea* among men produce symptoms that lead them to seek a medical evaluation, but treatment might not be delivered in time to prevent transmission to others. Among women, several infections, including Gonorrhea, do not produce recognizable symptoms until complications (e.g., PID) occur [2]. Infections due to *Neisseria gonorrhea*, similar to those due to *Chlamydia trachomatis*, are an important cause of PID and consequently can lead to infertility or ectopic pregnancies [3]. Because gonococcal infections among women are frequently asymptomatic, the U.S. Preventive Services Task Force (USPSTF) recommends that clinicians screen all sexually active women, including those who are pregnant, for gonorrhea infection if they are at an increased risk. Women aged < 25 years are at the highest risk for gonorrhea infection [2]. Other risk factors for gonorrhea include a previous gonorrhea infection, other sexually transmitted infections,

new or multiple sex partners, inconsistent condom use, commercial sex work and drug addiction [2]. On the other hand, the USPSTF does not recommend screening for Gonorrhea in men and women who are at low risk for infection [14].

Epidemiologic and biologic studies provide strong evidence that gonococcal infections facilitate the transmission of HIV infection [15]. The prevalence in the United States decreased 74% from 1975 to 1997, probably because in mid-1970s a control program for *Neisseria gonorrhea* infection began [3]. Since 1997 the numbers have remained stagnant with a slight increase in 2005. These increases and decreases reflect changes in screening programs, use of diagnostic tests with different performances, and changes in reporting practices [16]. Gonorrhea rates have declined among African Americans, but have increased in all other racial and ethnic groups since 2001. However, rates among African Americans remain markedly higher than among other racial and ethnic groups [3].

4 Syphilis

Syphilis is a sexually transmitted systemic disease caused by *Trepenoma pallidum* and has a highly variable clinical course. Syphilis is a genital ulcerative disease, causes significant complications if left untreated and facilitates the transmission of HIV [3]. The male-to-female ratio is 5/7. Untreated early syphilis in pregnant women results in perinatal death in up to 40% of cases and, if acquired during the four years preceding pregnancy, leads to infection of the fetus in over 70% of cases [17]. The rate of primary and secondary syphilis reported in the United States decreased during the 1990s. In 2000, the rate was the lowest since reporting began in 1941 [3] although the rate of syphilis in the United States declined 89.7% between 1990 and 2000, between 2001 and 2005 this rate had increased. This increase in rates was observed primarily among men. In 2005, for the first time in over 10 years, the rate of primary and secondary syphilis among women increased from 0.8 cases per 100 000 people in 2003 to 0.9 cases per 100 000 people in 2004 [3]. Increases among men who have sex with men have occurred at least since 2000 and continue through 2005. These men have been characterized by high rates of HIV co-infection and high risk sexual behavior [18, 19].

Patients who have syphilis might seek treatment for signs or symptoms at any stage in the disease. Primary infection is characterized by ulcer or chancre at the infection site, secondary infection manifestations include, but are not limited to, skin rash, mucocutaneous lesions, lymphadenopathy, tertiary infection by cardiac or ophthalmic manifestations, auditory abnormalities, or gummatous lesions [2]. Latent infections include those lacking clinical manifestations and are detected by serologic testing [2].

5 Human papillomavirus

HPV is another STD with important consequences because it can lead to development of anogenital cancers. This infection is characterized by the presence of visible, exophytic (raised) growths on the internal or external genitalia, perineum, or perianal region. However, the majority of HPV infections are asymptomatic, unrecognized, or sub-clinical [2].

HPV infections make up approximately 15%–20% of the population infected with an STD. Annual incidence of all types of genital HPV infection is estimated to be 5.5 million in the U.S. It is estimated that 75% of sexually active adults become infected with some form of genital HPV in their lifetime. The prevalence infected, by age group, was as follows: 14–19 years: 35%; 20–29 years: 29%; 30–39 years: 14%; 40–49 years: 12%; and 50–65 years: 6% [20–23].

There are more than 100 types of HPV and approximately 40 types are related to genital area infection [2]. Types 6 and 11 are the most common and recognizable by their verrucous presentation.

Types 16 and 18 are related to cervical cancer and are considered high risk types. Persistent infection with high risk types of HPV is the most common risk factor leading to cervical neoplasia [2]. Over 99% of cervical cancers have HPV DNA detected within the tumor. The overall prevalence of HPV types 16 and 18 was 8%. The prevalence of HPV types 16 and 18 by age group was: 14–19 years: 16%; 20–29 years: 10%; 30–39 years: 3%; 40–49 years: 2%; 50–65 years: 1% [24, 25].

In June 2006, a quadrivalent HPV vaccine was licensed by Food and Drug Administration for use in the United States. The vaccine provides protection against types 6, 11, 16, and 18, the most common types of HPV that cause the majority of cervical cancers. The vaccine is indicated for females aged 9–26 years old, preferably before they become sexually active [3, 26, 27].

6 Herpes simplex

Genital herpes is a common, chronic, life-long viral infection. Two types of Herpes simplex virus (HSV) have been identified: HSV-1 and HSV-2. The majority of cases (85%–90%) of recurrent genital herpes are caused by HSV-2 although HSV-1 might become more common as a cause of first episode genital herpes [2]. At least 50 million people in the United States have genital HSV infection. Approximately one million new cases of HSV-2 infection are diagnosed each year in the United States and the majority of people infected with HSV-2 have not been diagnosed with genital herpes. Seropositivity to HSV-2

is higher in HIV-infected persons and adults of lower socioeconomic status. Most women (80%) with HSV-2 antibodies have no clinical manifestations [28].

Many such people have mild or unrecognized infections but shed the virus intermittently in the genital tract. The majority of genital herpes infections are transmitted by persons unaware that they have the infection or who are asymptomatic when transmission occurs [2, 29]. People with lesions or prodromal symptoms should refrain from sexual activity to prevent transmission.

7 Prevention of STDs

In diagnosing and treating patients with STDs, we can effectively prevent complications and reduce the spread of these diseases to the general community. There are some regions in which some kinds of STDs can be considered generalized epidemics, for example with HIV/AIDS in Cambodia, Kenya and Honduras. Young women experience the long-term consequences of the STDs once they become infertile, or other serious consequences, such as death [30, 31]. All persons who seek evaluation and treatment for STDs should be screened for HIV infection as well. Screening should be routine, regardless of whether the patient is known or suspected to have specific behavioral risks for HIV infection. Individuals who are infected with STDs are 5–10 times more likely than uninfected individuals to acquire or to transmit HIV through sexual contact. The breaking of the genital tract lining or skin creates a portal of entry for HIV, and HIV-infected individuals with other STDs are more likely to shed HIV in their genital secretions. The most effective male method available for protection against STDs is the condom. Areas that can be completely covered by the latex condom are less susceptible to acquire STDs and condoms should be used every time to combat the idea in some parts of the world that condom-free intercourse is a sign of trust [32–34]. The correct and consistent use of condoms is highly effective in preventing sexual transmission of STDs and HIV among males [35, 36]. Condom use is increasing everywhere except in developing countries [34].

It is important to control the spread of STDs, and prevention can be the key to this process. Prevention should be based on education and counseling of the population, identification of symptomatic and asymptomatic people, effective diagnosis and treatment of these patients and their partners, and vaccination of people at risk [2, 37].

References

1 Weinstock H, Berman S, Cates W Jr. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. Perspect Sex Reprod Health 2004; 36: 6–10.

2 Centers for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2006. MMWR 2006; 55 (No. RR-11): 38.

3 Sexually Transmitted Diseases Surveillance 2005. Appendix 139–150.

4 MMWR–Morbidity and Mortality Weekly Report, CDC, August 4, 2006; 55.

5 Wentworth BB, Bonin P, Holmes KK, Gutman L, Wiesner P, Alexander ER. Isolation of viruses, bacteria and other organisms from venereal disease clinic patients: methodology and problems associated with multiple isolations. Health Lab Sci 1973; 10: 75–81.

6 Cohen DA, Farley TA, Taylor SN, Martín DH, Schuster MA. When and where do youths have sex? The potential role of adult supervision. Pediatrics 2002; 110: 66–72.

7 Bloor M, Thomas M, Hood K, Abdeni D, Goujon C, Hausser D, *et al.* Differences in sexual risk behaviour between young men and women travelling abroad from the UK. Lancet 1998; 352: 1664–8.

8 Weiss HA, Thomas SL, Munabi SK, Hayer RJ. Male circumcision and risk of syphilis, chancroid, and genital herpes: a systematic review and meta-analysis. Sex Transm Infect 2006; 82: 101–9.

9 Hutchinson J. On the influence of circumcision in preventing syphilis. Med Times Gazette 1855; 32: 542–3.

10 Dicker LW, Mosure DJ, Levine WC, Black DM, Berman SM. Impact of switching laboratory tests on reported trends in Chlamydia trachomatis infections. Am J Epidemiol 2000; 151: 430–5.

11 Scholes D, Stergachis A, Heidrich FE, Andrilla H, Holmes K, Stamm WE. Prevention of pelvic inflammatory disease by screening for cervical chlamydial infection. N Engl J Med 1996; 334: 1362–6.

12 Kamwendo F, Forslin L, Bodin L, Danielson D. Decreasing incidences of gonorrhea- and chlamydia-associated acute pelvic inflammatory disease: a 25-year study from an urban area of central Sweden. Sex Transmit Dis 1996; 23: 384–91.

13 CDC. Sexually Transmitted Disease Surveillance, 2004. Atlanta, GA: USA. Department of Health and Human Services, CDC, National Center for HIV, STD, and TB Prevention; 2005.

14 US Preventive Services Task Force. Screening for gonorrhea: recommendation statement. Ann Fam Med 2005; 3: 263–7.

15 Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sex Transm Infect 1999; 75: 3–17.

16 Centers for Disease Control and Prevention. Gonorrhea – United States, 1998. MMWR 2000; 49: 538–42.

17 Ingraham NR. The value of penicillin alone in the prevention and treatment of congenital syphilis. Acta Derm Venereol 1951; 31 (Suppl 24): 60.

18 Centers for Disease Control and Prevention. Primary and secondary syphilis among men who have sex with men–New York City, 2001. MMWR 2002; 51: 853–6.

19 D'Souza G, Lee JH, Paffel JM. Outbreak of syphilis among men who have sex with men in Houston, Texas. Sex Transm Dis 2003; 30: 872–3.

20 Weinstock H, Berman S, Cates W Jr. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. Perspect Sex Reprod Health 2004; 36: 6–10.

21 Koutsky LA. Epidemiology of genital human papillomavirus infection. Am J Med 1997; 102 (5A): 3–8.

22 Cates W Jr. Estimates of the incidence and prevalence of sexually transmitted diseases in the United States. American Social Health Association Panel. Sex Transm Dis 1999; 26 (4 Suppl): S2–7.

23 Revzina NV, Diclemente RJ. Prevalence and incidence of human papillomavirus infection in women in the USA: a systematic review. Int J STD AIDS 2005; 16: 528–37.

24 Datta SD, Koutsky L, Douglas J. Sentinel surveillance for human papillomavirus among women in the United States, 2003–2004 [Abstract No. MO-306]. In: Program and abstracts of the 16th Biennial Meeting of the International Society for Sexually Transmitted Diseases Research, Amsterdam, The Netherlands, July 10–13, 2005.
25 Datta SD, Koutsky L, Ratelle S. Type-Specific High-Risk HPV Prevalence from the HPV Sentinel Surveillance Project, US, 2003–2005 [Abstract No. P-099]. In: Program and abstracts of the International Human Papillomavirus Meeting, Prague, Czech Republic, September 2006.
26 Villa LL, Costa RL, Petta CA, Andrade RP, Ault KA, Giuliano AR *et al*. Prophylactic quadrivalent human papillomavirus (types 6, 11, 16 and 18) L1 virus-like particle vaccine I young women: a randomized double-blind placebo-controlled multicentre phase II efficacy trial. Lancet Oncol 2005; 6: 271–8.
27 Human Papillomavirus: HPV information for clinicians. Centers for Disease Control and Prevention. April 2007.
28 White C, Wardropper AG. Genital herpes simplex infection in women. Clin Dermatol 1997; 15: 81–91.
29 Langenberg AG, Corey L, Ashley RI, Leong WP, Straus SE. A prospective study of new infections with herpes simplex virus type 1 and 2. Chyron HSV Vaccine Study Group. N Engl J Med 1999; 341: 1432–8.
30 Hillis SD, Joesoef R, Marchbancks PA, Wasserheit JN, Cates W Jr, Westrom L. Delayed care of pelvic inflammatory disease as a risk factor for impaired fertility. Am J Obstet Gynecol 1993; 168: 1503–9.
31 Westrom L, Joesoef R, Reynolds G, Hagdu A, Thompson SE. Pelvic inflammatory disease and fertility: a cohort study of 1 844 women with laparoscopically verified disease and 657 control women with normal laparoscopy. Sex Transm Dis 1992; 19: 185–92.
32 Marston C, King E. Factors that shape young people's sexual behaviour: a systematic review. Lancet 2006; 368: 1581–6.
33 Hillier L, Dempsey D, Harrison L. "I'd never share a needle"-(but I often have unsafe sex): considering the paradox of young people's sex and drugs talk. Cult Heath Sex 1999; 1: 347–61.
34 Wellings K, Collumbien M, Slaymaker E, Singh S, Hodges Z, Patel D, *et al*. Sexual behaviour in context: a global perspective. Lancet 2006; 368: 1706–28.
35 Holmes KK, Levine R, Weaver M. Effectiveness of condoms in preventing sexually transmitted infections. Bull World Health Organ 2004; 82: 454–61.
36 Ness RB, Randall H, Richter HE, Peipert JF, Montagno A, Soper DE, *et al*. Condom use and the risk of recurrent pelvic inflammatory disease, chronic pelvic pain or infertility following an episode of pelvic inflammatory disease. Am J Public Health 2004; 94: 1327–9.
37 Gottlieb SL, Douglas JM Jr, Foster M, Schmid DS, Newman DR, Baron AE, *et al*. Incidence of herpes simplex virus type 2 infection in 5 sexually transmitted disease (STD) clinics and the effect of HIV/STD risk-reduction counseling. J Infect Dis 2004; 190: 1059–67.