A Case–Control Study of Beliefs and Behaviors Associated With Sexually Transmitted Disease Occurrence in Estonia

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Background: Epidemiologic data document rapidly increasing sexually transmitted disease (STD) rates throughout Eastern Europe.

Goal: This case–control study was designed to delineate factors contributing to the STD epidemic in Estonia.

Study Design: For this study, 189 study participants and 112 control subjects completed a behavioral questionnaire and underwent testing for Neisseria gonorrhoeae, Chlamydia trachomatis, and Treponema pallidum.

Results: The prevalence of STDs among the control subjects was 32%. Although the participants believed that condoms prevent STDs, only 17% reported consistent use. Methods believed to prevent transmission included washing the genitals (65%), urinating (26%), douching (35%), and using oral contraceptives (19%). An interaction between sex and travel outside Estonia (odds ratio, 0.1; 95% CI, 0–0.7) reflects the fact that males with STDs were more likely to report travel (46% of participants and 45.5% of control subjects with STD) than were those without STD (16.1% of controls without STD).

Conclusions: STD rates are related to high-risk sexual behavior among males traveling outside of Estonia. Intervention is needed to promote understanding of disease transmission dynamics in this area, and to decrease sexual risk behavior, particularly in the context of travel.

CONCOMITANT WITH THE CESSATION of communist rule in 1991, the Baltic countries of Latvia, Estonia, and Lithuania have experienced a 10-fold increase in rates of sexually transmitted disease (STD).1 For example, in Estonia, incidence rates of syphilis increased from 3 to 75.7 per 100,000 between 1990 and 1998, as reported by the Estonian Ministry of Social Affairs, October 2000. In addition, although Estonia had relatively low rates of HIV infection until last year, there recently has been a dramatic increase in the number of cases. At the end of 1999, the World Health Organization reported that there were only 50 known persons with HIV living in Estonia. However, in 2000 an outbreak occurred in western Estonia, resulting in the report of more than 300 cases to Estonia’s mandatory State Health Protection Service.2 Injection drug use was posited to be a major contributing factor to this outbreak, as it has been throughout Eastern Europe.3–4

Several factors likely contribute to the increasing rates of STD/HIV infection in Estonia. First, the country borders the Russian Federation, where drug use, high rates of STD, economic instability, and low knowledge of disease transmission dynamics have been linked to a 100-fold increase in newly identified HIV infections between 1996 and 1998.5 In this same period, 3- to 175-fold increases in syphilis occurred in Eastern European and Central Asian countries,6–7 with a prevalence rate among pregnant women of 710 per 100,000 in the Moscow region in 1997.8 It has been posited that the increased mobility of populations across borders, in conjunction with a changing economic climate and shift toward a more western culture, may make certain risk behaviors, such as trading sex for money and engaging in casual sex relationships, more prevalent in Estonia and the other Baltic countries.9–10

Changes in the political and economic environment of Eastern Europe also have been associated with changes in the control of STDs. A highly developed system of surveillance for STDs was put in place during World War II. At that time, there was active compulsory case finding and screening of certain occupational and clinical populations. The STD control system since the breakup of the Soviet Union has been characterized by serious shortfalls in funding and decentralization, as well as increased demand for
confidentiality. Additionally, medications previously provided free must now be purchased. These changes have been mirrored in former Soviet states such as Estonia, and clearly have had an impact on the ability of the medical system to track epidemics and to identify and treat patients with STD.

Although the prevalence of HIV in Estonia is still low overall, rising STD rates and drug use, coupled with increasing travel across borders to areas with higher HIV prevalence, could create the conditions for an HIV epidemic throughout the country. Irrespective of the changes occurring in the health system, little systematic research has been conducted to ascertain what risk behaviors are most closely associated with the evolving STD/HIV epidemic in these areas. In addition, there has not been adequate investigation into knowledge regarding disease transmission within this population. The current study sought to identify predictors of STD acquisition in Estonia, and to provide further insight into the factors that may be responsible for the increase in their incidence.

Materials and Methods

Respondents

The current study was conducted at the Tartu University Clinic of Dermatovenerology. This medical school is the only one in Estonia, and the STD clinic is the second largest in the country. A case–control method was used. Between September 1996 and June 1998, 301 men and women older than 18 years were recruited for study participation. The cases comprised all the participants who presented for care to the Clinic of Dermatovenerology with a diagnosis of Chlamydia trachomatis, Neisseria gonorrhoeae, or Treponema pallidum. Of the 229 clinic registrants approached for study participation, 189 were enrolled as cases.

The control subjects were selected at random from the regional population registry. To all the participants selected, a letter was sent describing the study and requesting them to contact study representatives at Tartu University. The letter informed them that the study would involve an STD examination. Altogether, 1100 letters were sent from the registry, to which 112 persons responded. These respondents were enrolled as control subjects. The control subjects were further divided as a function of their STD status at the time of enrollment. Demographic information derived from the registry showed no statistically significant differences between those recruited and those declining participation in terms of documented gender, marital status, or education.

Procedures

All the patients enrolled in the study were asked to complete a self-administered questionnaire after providing informed consent for their participation. The items included in the questionnaire were developed in English with the input of STD healthcare providers in Estonia, translated into Estonian and Russian, and piloted on a sample of 10 clinic patients. All the study procedures were approved by the Institutional Review Board at SUNY Downstate Medical Center and by the Ethics Board at Tartu University.

The participants were asked to report on their lifetime history of STD diagnosis before study entry, drug use, and payment for sex activity. The prevalence of alcohol-related problems was determined via the 4-item CAGE questionnaire. The respondents also answered a series of questions on behavior over the preceding 3 months. These questions asked whether they had been sexually active, had more than three sex partners, used condoms consistently (always or almost always), engaged in sex activity while drunk, offered money to someone in exchange for sex, had a casual sex partner, engaged in anal sex, or used illicit drugs. Additional questions focused on whether respondents believed their current sex partners had other sex partners in the preceding 3 months, and whether they had traveled outside Estonia in the past year. Finally, ratings were conducted for beliefs regarding STD prevention. The perceived efficacy of different activities in preventing the transmission of STD was assessed on a 3-point scale (ineffective, effective, don’t know). The items included washing the genital area after having sex, urinating after sex, using condoms, douching after sex, and using birth control pills.

All the participants received an examination in which cervical or urethral cultures were obtained for N gonorrhoeae and C trachomatis. Specimens for gonorrhea were plated on Thayer-Martin medium (Nouvag Aptaca srl, Canelli, Italy). Cultures for chlamydia were performed using McCoy cell monolayers (European Collection of Cell Cultures, Salisbury, UK). In addition, syphilis serologic status was determined using the rapid plasma reagin test with T pallidum, with fluorescent treponemal antibody for confirmation.

Statistical Analysis

Demographic and behavior variables were compared across groups (i.e., case participants, control subjects with STD, and control subjects without STD) using Fisher exact test for dichotomous variables and t tests for continuous variables. Beliefs about STD transmission were compared across groups using likelihood ratio χ² tests. The odds of having an STD associated with engaging in a series of sexual risk behaviors were estimated among those who reported sex activity in the preceding 3 months via logistic regression models, with group and sex included as main effects and a product term included to assess moderator effects. Demographic and behavior factors that differentiated group membership on the basis of these analyses were
selected for inclusion in a multinomial logistic regression model.

Results

Participant Characteristics

Of the total study participants, 225 (74.7%) had positive test results for C. trachomatis, N. gonorrhoeae, or T. pallidum. Among the 189 case participants, 71% had positive test results for chlamydia, 24.1% for gonorrhea, and 25% for syphilis. Among the case participants, 15 had positive test results for gonorrhea and chlamydia, 11 for syphilis and chlamydia, 1 for syphilis and gonorrhea, and 1 for all STDs. Among the 112 controls, 36 (32.1%) had positive test results for at least 1 STD; 33 for chlamydia, 2 for gonorrhea, and 1 for gonorrhea and chlamydia. No control subjects had positive test results for syphilis. The control subjects with STDs were more likely to have positive test results for chlamydia than were the case participants (94.4% versus 71%; \( P < 0.05 \)), and less likely to have positive test results for gonorrhea (8.6% versus 24.1%; \( P < 0.05 \)).

The respondents ranged in age from 18 to 57 years (mean, 26.5 ± 6.4 years). A small majority (56.7%) of respondents were female. The case participants tended to be younger than the control subjects, with 67.5% of them falling below the median age of 25 years, as compared with 50% of the control subjects presenting with an STD and 36.6% of them with no positive test results for an STD (\( P < 0.05 \)). Approximately half (54%) of the participants included in the study were either married or living with a sexual partner. Whereas 62% of the sample was employed, 29.2% reported that they currently were going to school. Most of the population (80.7%) reported that they were Estonian, whereas 15.9% reported a Russian background. A history of drug use was reported by 15.1% of the entire sample, with 6.6% reporting drug use in the past 3 months. The drugs reported by those who had used drugs in the past 3 months included marijuana (\( n = 6 \)), cocaine (\( n = 4 \)), and amphetamines (\( n = 6 \)). One respondent reported using injection heroin as well as ketamine. The prevalence of a clinically significant CAGE score was 35.2% across the entire sample. There were no statistically significant differences among case participants, control subjects with STDs, and control subjects without STDs in terms of gender, marital status, employment rates, drug use history, or CAGE scores.

Beliefs About Prevention of Sexually Transmitted Diseases

Both case participants and control subjects held misperceptions about methods for preventing the transmission of STDs, although no statistically significant group differences were found for level of knowledge. Across the entire sample, 65.2% believed that washing the genital area after sex is an effective means for preventing STD (6.3% reported that they did not know); 25.7% believed that urinating after sex is effective (35.8% did not know); 35.5% believed that douching is effective (43.8% did not know); and 19.5% believed that using birth control pills is effective (22.2% did not know). Most of the participants (94.5%) believed that condoms are effective for STD prevention, whereas 3.1% claimed that they were unsure about their efficacy.

Univariate Behavior Associations With Group Membership

Across all groups, the respondents reported recent engagement in a series of sex behaviors (Table 1). In logistic regression models, there was a main effect of group membership after controlling for sex across several behaviors including the proportion who reported (1) a previous STD diagnosis (cases, 58.1%; controls with STD, 26.5%; controls without STD, 40%), (2) three or more sex partners in the past 3 months (cases, 21%; controls with STD, 5.7%; controls without STD, 8.5%; \( P < 0.05 \)), (3) a casual sex partner in the past 3 months (cases, 43%; controls with STD, 20.6%; controls without STD, 20.3%; \( P < 0.05 \)), and (4) sex activity while intoxicated with alcohol (cases, 67.4%; controls with STD, 48.5%; controls without STD, 43.1%; \( P < 0.05 \)). In turn, respondents who reported engaging in sex activities while intoxicated were more likely to report inconsistent condom use in the past 3 months (86.3% versus 76.4%; \( P = 0.055 \)), three or more sex partners (25.9% versus 6.4%; \( P < 0.05 \)), a casual sex relationship (52.6% versus 19.6%; \( P < 0.05 \)), and solicited sex activity (7.8% versus 1.1%; \( P < 0.05 \)). No group differences were detected in the proportion reporting lifetime drug use, a high CAGE score, travel outside the country in the past year, abstinence in the past 3 months, and payment for sex activity in the past 3 months, and use of condoms in the last 3 months always or almost always.

There were main effects of sex after adjusting for group membership for (1) lifetime drug use (males, 22.7%; females, 9.5%; \( P < 0.05 \)), (2) CAGE scores denoting alcohol problems (males, 56.9%; females, 18.8%; \( P < 0.05 \)), (3) three or more sex partners in the past 3 months (males, 30.2%; females, 5.4%; \( P < 0.05 \)), (4) prevalence of casual sex partners in the past 3 months (males, 50.8%; females, 22.3%; \( P < 0.05 \)), (5) intoxication during sex activity (males, 69.4%; females, 51.6%; \( P < 0.05 \)), and (6) payment for sex in the past 3 months (males, 10.5%; females, 0%; \( P < 0.05 \)).

Product terms were computed between sex and group membership for each behavior. The interaction predicting travel outside Estonia in the past year approached statistical significance (\( P = 0.07 \)), such that males with STDs were
more likely to report travel in the past year (cases, 46%; controls with STD, 45.5%) than those without STD (16.1% travel for controls without STD). These differences were not seen among women (cases, 32%; controls with STD, 36%; controls without STD, 31.8%). Sex relationships with new partners during travel in the past year were reported by 16.1% of the male case participants, whereas none of the control subjects reported this behavior.

Multivariate Behavior Associations With Group Membership

A multinomial logit model was used to assess for group differences as a function of age, STD history, travel, casual sex partners, three or more sex partners, sex activity during intoxication, and gender (Table 2). A product term representing the interaction of sex and travel significantly increased the fit of the model, so it also was included ($\chi^2$ difference = 6.9; df = 2; $P < 0.05$). The resulting equation was statistically significant ($\chi^2 = 53.1; df = 16; P < 0.05$), with age, lifetime history of an STD, sexual intercourse during intoxication, and the product term of sex and travel differentiating the groups. In terms of age, those younger than the median age of 25 years were significantly more likely to have an STD than control subjects without an STD (odds ratio [OR], 3.3; 95% CI, 1.7–10) and control subjects with an STD (OR, 3.3; 95% CI, 1.5–10). Individuals who reported an STD diagnosis before study entry were more than four times more likely to be case participants than control subjects with an STD (OR, 4.2; 95% CI, 1.6–11.2). The only sex behavior that differentiated group membership after controlling for other factors in the model was sexual intercourse during intoxication. Those engaging in this behavior were $3 \frac{1}{2}$ times more likely to be case participants than control subjects without an STD (OR, 3.5; 95% CI, 1.6–7.6). Finally, after controlling for all the other variables in the multivariate model, there was a statistically significant interaction between travel outside Estonia by sex of the respondent for the comparison of case participants and control subjects without STD (OR, 0.1; 95% CI, 0–0.7) and a trend toward statistical significance for the comparison of control subjects with STD and control subjects without STD. These interactions reflect the greater odds of STD among males who traveled (OR, 4.4; 95% CI, 1.5–16).

Conclusions

Increased rates of STD in Estonia are associated with the patterns of sex risk behaviors typical of STD epidemics in countries with similarly shifting political and social climates. Foremost, travel of men outside Estonia was associated with STD risk. Travel also was a marker for casual sex relationships, sex in exchange for money, and sex activity with a new partner during travel. This suggests that sex risk-taking outside the country may increase the likelihood of exposure to disease and subsequently increase the pool of infected persons within the region. Further investigation into the sexual health of travelers may yield important insights into STD transmission in this population.
Case participants and control subjects exhibited similarly high levels of misconceptions about methods for preventing disease transmission. Although this population generally was aware that condom use is an effective prevention tool, more than 65% believed that washing the genital area is effective, and one fifth to one third of the population believed that using birth control pills, douching after intercourse, or urinating after intercourse also are effective. Incorrect knowledge regarding these issues may place individuals at increased risk for HIV/STD if they rely on these behaviors for disease prevention. Education on the efficacy of different modes of disease transmission and prevention is important in this population.

Case participants rather than control subjects with negative test results for STD were more likely to report recent alcohol intoxication during sexual intercourse. Those reporting this behavior also were more likely to have multiple and casual sex partners, more likely to engage in sex exchange behavior, and less likely to use condoms consistently. It may be that a variable such as engaging in sex activity while intoxicated may be a marker for a behavior style that is more risky overall, as compared with one that plays a more causal role in STD transmission. However, these findings, coupled with the fact that more than one third of the population had a CAGE score indicating alcohol-related problems, suggest that identification and treatment of alcohol addiction may be an important component of disease control in this population. Further study is needed to ascertain the precise relations between these variables.

Low rates of drug use may help to explain why there has been a low impact of HIV in Estonia. Less than 7% of respondents reported any recent drug use, and only one reported injection drug use. In the neighboring Russian Federation, however, UNAIDS has estimated that the proportion of HIV infections nearly doubled from the end of 1997 to the end of 1999, and that nearly all of these infections were attributable to injection drug use.\textsuperscript{14} Given increased travel between these regions, drug use prevention may be an important tool for preventing an epidemic of HIV infection in Estonia.

Although other sex risk behaviors did not differentiate between case participants and control subjects with and without an STD, several findings warrant further attention. First, although almost all the respondents were aware that condom use protects against STD, less than one fifth reported using condoms always or almost always. Second, the 32% STD prevalence rate among those recruited to this study as control subjects indicates that improved disease identification and treatment is warranted. The individuals with STD in the control group were more likely to have chlamydia, and less likely to have had gonorrhea or syphilis. Given that symptoms of chlamydia often are less noticeable than the symptoms of these other diseases, it may be that many of these individuals were unaware of their disease, and did not avoid treatment for a suspected condition. These findings suggest that this population may benefit from efforts aimed at greater outreach and screening, coupled with sex risk reduction counseling.

Several limitations to the data exist. First, given the low rate of response from the mail recruitment of controls and the extremely high rate of STD among this group, it is likely that some bias existed in the group. For instance, the letter of invitation explicitly stated that an STD examination would be provided as a part of the study activities. Therefore, control subjects who responded to this letter may have done so because they were explicitly seeking STD care for an extant symptomatic condition. For these reasons, the STD prevalence rate among the control subjects was likely to overrepresent the true rate of infection in this group. Similarly, differences reported in risk behavior and cognitions may be attributable to sample selection, such that those with suspected conditions were more likely to differ than those without these conditions. These methodological concerns are often inherent in a case–control study such as this one. Given that there still were statistically significant behavior...
A second issue relates to the relatively small sample size. The small number of participants may have resulted in decreased power to detect differences of interest, particularly as they related to moderating relations. Clearly, further research with a larger and more representative sample would help to support the validity of the cognitive and behavior differences found between case participants and control subjects in this study.

The epidemic nature of STDs currently documented in Estonia and the other Baltic countries is consistent with the current findings that demonstrate high rates of sex risk behavior and inadequate knowledge regarding prevention of disease transmission. It is important to note that the rise in STDs in the region, although quite dramatic, also is very recent. These factors signify that basic health education and promotion efforts implemented across the entire population should be a public health priority, particularly now while the rates of HIV in Estonia still are low.

References


