

Sociodemographic, Sexual Behavior, and Microbiological Profiles of Men Attending Public Health Laboratories for Testing for Sexually Transmitted Diseases

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ABSTRACT In order to identify the groups at risk of sexually transmitted diseases (STDs), we assessed the sociodemographic profiles of men testing for STD, their sexual habits, and the results of microbiological analysis. During a three-year period, a total of 700 men older than 18 years of age completed the questionnaire regarding sociodemographic and sexual behavior. Urethral swabs were taken for microbiological analysis. Thirty-three percent of respondents reported not using condoms. Those that do not use condoms were predominantly less educated, unmarried but in steady relationships, employed, with children, and smokers. Alcohol or drug usage before sexual intercourse was disclosed by 21.4% of respondents, and 10.3% respondents reported sexual intercourses with commercial sex workers. Finally, 24.0% respondents reported sexual relations abroad. In 28.1% of subjects, one or more pathogens were observed in urethral swabs. The most commonly diagnosed microorganism was *Ureaplasma urealyticum*, followed by *Chlamydia trachomatis*, *Mycoplasma hominis*, *Trichomonas vaginalis*, and *Neisseria gonorrhoeae*. This study identified several factors that may contribute to the general risk of STD transmission, which will serve to better understand the transmission dynamics and implementation of adequate prevention programs.

KEY WORDS: sexual behavior, trichomoniasis, urethritis, chlamydia, condoms

INTRODUCTION

Sexually transmitted diseases (STDs) still represent a substantial public health problem in industrialized and developing countries alike. In the context of the Republic of Croatia, the most important factors that

contribute to the spread of STDs are low and irregular condom use, casual sex partners, and an inadequate level of knowledge about prevention of infections and sexuality in general (1-4). Furthermore, increased



travelling has also been recognized as a significant contributing factor in the spread of human immunodeficiency virus (HIV) and other STDs due to sexual promiscuity abroad (5).

Nevertheless, Croatia has a rather favorable situation with regards to STDs due to very efficient health-care measures and high-quality interdisciplinary work (6). There is also a comprehensive national open-access network of public health laboratories and centers for diagnosis and treatment of STDs. Such laboratories and testing centers are important venues for both control of diseases and health promotion, regardless of the fact that a high proportion of individuals tested are found to be free of STD on screening (4).

However, although men frequently visit public health laboratories and testing centers, relatively little is known about their sociodemographic factors and sexual behavior, as routine collectible data is usually limited to age, sex, and isolated pathogens. Therefore, the aim of our study was to obtain insights into the profiles of men that use public health laboratories to test for STDs, as well as to collect data on safe sex practice and condom usage, substance use before sex, purchasing sexual services, and sexual practices abroad. Furthermore, our goal was to evaluate the frequency of specific microbiological isolates and compare our results with the available literature on the topic.

SUBJECTS AND METHODS

The survey was conducted at the Department of Microbiology of the Croatian Institute for Public Health over a three-year period and included a total of 700 patients older than 18 years of age. Respondents were referred to the public health laboratory for microbiological analysis on sexually transmitted diseases for several reasons: due to signs of urethral inflammation (urethritis), as a part of a periodical medical examination, or at their own request. The study was approved by the Ethics committees of the Croatian Institute for Public Health and the School of Medicine, University of Zagreb. Before enrolling in the study, participants were acquainted with the aim and purpose of the research and gave their written informed consent.

Before samples were taken for microbiological analysis, patients were asked to complete the questionnaire covering the sociodemographic characteristics (age, gender, marital status, place of residence, education, etc.). Additionally, data concerning intimacy and family status, sexual habits – sexual relations outside Croatia, sexual orientation, number of sexual partners in the past year, the age at first sexual intercourse, use of condoms during sex and reason for not using them, purchasing sexual services, charging sexual services, morbidity from sexually transmitted diseases in the past, the use of drugs/alcohol prior to

Table 1. Safe sex practice through condom use

Item	Condom use		P value
	Yes N (%)	No N (%)	
Residence	Urban	418 (67.0)	0.114
	Rural	44 (57.9)	
Employment	Yes	313 (60.8)	<0.001
	No	149 (80.5)	
Education level	Primary school	27 (27.8)	<0.001
	High school	314 (74.1)	
	College/Faculty	121 (67.6)	
Marital status	Married	170 (58.8)	<0.001
	Steady relationship	54 (37.0)	
	Single	238 (89.8)	
Children	Yes	181 (59.9)	0.003
	No	281 (70.6)	
Smoking	Yes	220 (59.1)	<0.001
	No	242 (73.8)	
Testing on HIV	Yes	117 (67.6)	0.602
	No	345 (74.7)	

Table 2. Alcohol or drug use before sex

Item	Alcohol/drug use		P value
	Yes N (%)	No N (%)	
Residence	Urban	137 (22.0)	<0.001
	Rural	13 (17.1)	
Employment	Yes	93 (18.1)	0.001
	No	57 (30.8)	
Education level	Primary school	25 (25.8)	0.030
	High school	92 (21.7)	
	College/Faculty	33 (18.4)	
Marital status	Married	50 (17.3)	<0.001
	Steady relationship	12 (8.2)	
	Single	88 (33.2)	
Children	Yes	43 (14.2)	<0.001
	No	107 (26.9)	
Smoking	Yes	93 (25.0)	0.014
	No	57 (17.4)	
Testing on HIV	Yes	61 (35.3)	<0.001
	No	89 (16.9)	

sexual activity, testing for the presence of antibodies to HIV, as well as information about smoking habits – were collected.

For microbiological analysis, urethral swabs were taken for laboratory work-up on following sexually transmitted pathogens: *Neisseria gonorrhoeae* (*N. gonorrhoeae*), *Ureaplasma urealyticum* (*U. urealyticum*), *Mycoplasma hominis* (*M. hominis*), *Chlamydia trachomatis* (*C. trachomatis*) and *Trichomonas vaginalis* (*T. vaginalis*). All but *C. trachomatis* infection were diagnosed by standard cultivation method. *C. trachomatis* was detected using an antigen detection method (Microtrak Chlamydia_EIA, Trinity Biotech) performed according to manufacturer instructions.

The difference between groups was assessed using chi-square and Fisher's exact tests when appropriate. Analysis of numerical data was performed using the t-test or Mann-Whitney U test, depending on the data distribution. A *P* value of <0.05 was considered to be significant. Statistical analysis was performed using SPSS Version 13.0 under the license of the University of Edinburgh, Public Health Sciences.

RESULTS

The average age of the participants included in this study was 37.8 years. The median age of all subjects was 35.0 years with an associated interquartile range (IQR) of 15.0 years. Urban residence was reported by 624 (89.1%) participants, whereas 76 (10.9%)

out of 700 reported rural residence. Regarding the level of education, the smallest proportion of participants had finished only primary or elementary school (97; 13.9%), a majority of the participants had a high school degree (424; 60.6%), whilst an undergraduate/college or higher degree was reported by 130 (26.0%) participants. A total of 515 (73.6%) respondents were employed and 185 (26.4%) were unemployed; 289 (41.3%) respondents were married, 146 (20.9%) were unmarried (but in a steady relationship), while 265 (37.9%) were single. A total of 302 (43.1%) participants reported having one or more children. Heterosexual sexual orientation was reported by 654 (93.4%) of respondents, bisexual orientation by 26 (3.7%), whereas 20 (2.9%) participants were homosexual.

Regarding safe sex practices, a total of 33.1% respondents reported not using condoms. Those that never use condoms had significantly less sexual partners in the previous year (median 1 partner, IQR 1) in comparison with those that use them at least occasionally (median 2.5; IQR 4) (*P*<0.001). Furthermore, respondents that never use condoms had in general less education (72.2% of subjects with only elementary school stated they never use condoms, in comparison with 25.9% and 32.4% of those with high school and college degree, respectively; *P*<0.001) (Table 1). According to marital status, the highest number of respondents that never use condoms was found in unmarried men in steady relationships (63.0%), followed

Table 3. Sex with commercial sex workers

Item	Sex with commercial sex workers		P value
	Yes N (%)	No N (%)	
Residence	Urban	70 (11.2)	0.020
	Rural	2 (2.6)	
Employment	Yes	49 (9.5)	0.262
	No	23 (12.4)	
Education level	Primary school	24 (24.7)	<0.001
	High school	22 (5.2)	
	College/Faculty	26 (14.5)	
Marital status	Married	28 (9.7)	0.001
	Steady relationship	27 (18.5)	
	Single	17 (6.4)	
Children	Yes	30 (9.9)	0.789
	No	42 (10.6)	
Smoking	Yes	53 (14.2)	<0.001
	No	19 (5.8)	
Testing on HIV	Yes	29 (16.8)	0.001
	No	43 (8.2)	

by married (41.2%) and single men (10.2%) ($P < 0.001$). Employed respondents, those with children, as well as smokers were groups prone to avoiding condoms (Table 1). Principal reasons for not using condoms disclosed by respondents are shown in the Figure 1.

Alcohol or drug usage before sexual intercourse (which was disclosed by 21.4% of respondents) was statistically more commonly reported by younger respondents (median age for those that always use them was 30 years with IQR 16 of years, for those that use them occasionally 37 years with IQR of 14 years, whereas the median age for those that never use them was 33 years with IQR of 10.5 years). Higher usage was also reported by respondents residing in cities, those with lower levels of education, those who

were unemployed, single, and those without children (Table 2). Moreover, the use of alcohol or drugs was more common in smokers and those that underwent HIV testing (Table 2). It must be noted that the use of aforementioned substances was more frequently reported by respondents who had sexual relations abroad, i.e. outside Croatia (31.0%), compared with those who did not report sexual activity in foreign countries (18.6%) ($P < 0.001$). In addition, 61.5% of bisexual respondents reported alcohol or drug usage in comparison with 20.1% heterosexual and 15.8% homosexual respondents.

A total of 72 (10.3%) respondents reported regular/occasional sexual intercourses with commercial sex workers, whereas 628 (87.7%) of participants said

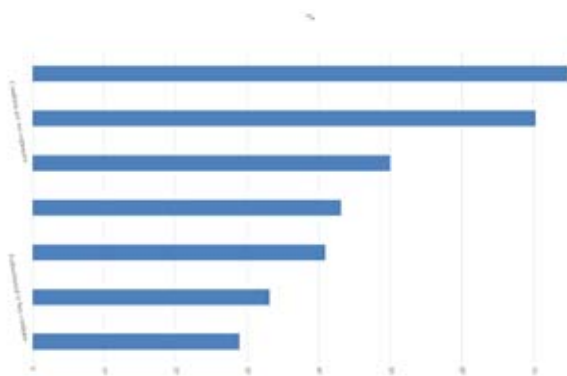


Figure 1. Stated reasons for not using condoms.



Figure 2. Graphical summary of European countries according to the respondents' frequency of sexual intercourses outside the Republic of Croatia.

Table 4. Sexual relations abroad

Item	Sexual relations abroad		P value	
	Yes N (%)	No N (%)		
Residence				
	Urban	160 (25.6)	464 (74.4)	0.004
	Rural	8 (10.5)	68 (89.5)	
Employment				
	Yes	116 (22.5)	399 (77.5)	0.127
	No	52 (28.1)	133 (71.9)	
Education level				
	Primary school	30 (30.9)	67 (69.1)	0.188
	High school	100 (23.6)	324 (76.4)	
	College/Faculty	38 (21.2)	141 (78.8)	
Marital status				
	Married	50 (17.3)	239 (82.7)	0.001
	Steady relationship	37 (25.3)	109 (74.7)	
	Single	81 (30.6)	184 (69.4)	
Children				
	Yes	58 (19.2)	244 (80.8)	0.010
	No	110 (27.6)	288 (72.4)	
Smoking				
	Yes	90 (24.2)	282 (75.8)	0.898
	No	78 (23.8)	250 (76.2)	
Testing on HIV				
	Yes	72 (41.6)	101 (58.4)	<0.001
	No	96 (18.2)	431 (81.8)	

they never paid for sexual services. On the other hand, none of the subjects reported taking money for sexual services. Sexual service purchase was statistically more often pursued by those with urban residence ($P=0.020$), those in a steady relationship ($P=0.001$), as well as those with primary school and college (or higher) education ($P<0.001$) (Table 3). Furthermore, a total of 168 (24.0%) respondents answered positively to the question of whether they had sexual relations abroad (outside Croatia). A majority of those were individuals with urban residence ($P=0.004$), single ($P=0.001$), and without children ($p=0.010$) (Table 4). In addition, those with sexual relations outside Croatia more frequently underwent HIV testing ($P<0.001$) (Table 4). The majority of sexual contacts abroad were noted in neighboring countries – Bosnia and Herzegovina (18.9%), Italy (18.9%), Slovenia (14.5%), and Germany (11.9%) (Figure 2). Although reported less frequently, sexual contacts abroad were also noted in more distant countries, outside the European region – Brazil (1.9%), Japan (1.9%), Russia (1.9%), Thailand (1.9%), Cuba (1.3%), United States of America (1.3%), and Mexico (0.6%).

Urethral swab samples were tested for *N. gonorrhoeae*, *U. urealyticum*, *M. hominis*, *C. trachomatis*, and *T. vaginalis*, which revealed an infection with certain pathogens in a total of 197 (28.1%) subjects. 131 (66.5%) of them were infected with only one of the aforementioned microorganisms, 51 (25.9%) of them

with two, 11 (5.6%) with three, 3 (1.5%) with four, and 1 (0.5%) subject had concomitant infection with all five of the tested microorganisms. The most commonly observed microorganism in this study was *U. urealyticum*, followed by *C. trachomatis*, *M. hominis*, *T. vaginalis*, and *N. gonorrhoeae* (Figure 3). Respondents also reported some other infectious diseases in their medical history – 7 (1.0%) of them reported hepatitis B, 3 (0.4%) reported hepatitis C, 56 (8.0%) reported genital herpes, whereas 119 (17.0%) reported human papillomavirus infection.

DISCUSSION

The principal aim of this study was to achieve insights into the sociodemographic profile and sexual

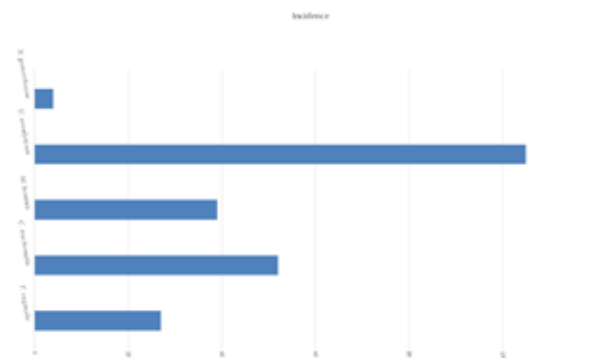


Figure 3. Results of the microbiological analysis of urethral swab samples.

behavior of men attending public health laboratories for STD testing, as well as to evaluate the frequency of specific microbiological isolates. The strengths of this study are a large enough sample size (with sufficient statistical power to analyses multivariate models), survey and testing taking place in a single public health laboratory with rigorously controlled conditions (thus ensuring uniformity and comparability of results), as well as microbiological analysis of the most prevalent sexually transmitted pathogens in Croatia.

There are also several limitations to this study. This paper studied a male population that consists of men predominantly from the city of Zagreb, Croatia; therefore the results may not be generalizable to other male populations. There is also a concern over response bias, even though we aimed to minimize any kind of information bias through standardized interviews led by trained personnel. Regarding substance use, our study did not discriminate between various types of drugs and the reasons for taking them. The conducted microbiological analysis was based only on urethral swab samples and did not include some less frequent pathogens (for example, *Mycoplasma genitalium*). Additionally, microbiological analysis was performed with routine laboratory methods at the time (i.e. cultivation and antigen detection), which are less sensitive in comparison with the latest molecular detection techniques, especially for those pathogens that are hard to cultivate such as *C. trachomatis* and *T. vaginalis* (7,8).

Although the effectiveness of condoms in preventing sexually transmitted diseases (including HIV) is well known, consistent condom usage has remained a challenge. This has been reinforced by our study results as well (where 34% of respondents reported no condom usage) but is also supported by other researchers in the medical literature. In a study from Eastern Croatia, no condom use was reported by 60.5% of men with two or more sexual partners during a one-year study period (9), whereas in another study from Zagreb, 35% of the individuals tested for HIV infection at the Voluntary Counselling and Testing Center reported that they never or only occasionally used a condom with a non-regular partner (4). A recent study from India on 14,137 attendees of an STD clinic found that married older men who report contact with commercial sex workers and present with genital ulcer disease are at significant risk of failure to use a condom after first exposure to testing and counselling (10). On the other hand, a study on 928 patients from four public health outpatients clinics in the US suggest that the majority of attendees hold positive perceptions about condoms and their use (although sex, race, and age showed significant

associations with negative perceptions about condom usage) (11).

Similarly to the reasons stated for not using condoms in our study (Figure 1), a survey of patients visiting STD clinics in Baltimore by Jadack *et al.* identified that the most frequent reasoning for not using condoms was partner trust (which is in accordance with our findings), followed by the "feel" of condoms and lack of condom availability (12). Their respondents also reported barriers to condom usage that included beliefs about condom sensation and partner relationships (12). Similar results were obtained by Abdullah *et al.* in their study of the Hong Kong Chinese population, where 80% of men reported inconsistent condom use (13). Again, the most common reason was a trustable partner, followed by the use of a substitute contraceptive and dislike for condoms (13).

Interestingly, in Africa the reasons for not using condoms can be quite different. A study set in Mombasa analyzing the rationalizations of men pursuing unsafe sex revealed that the most common reasons for not using condoms were the perceived lack of benefits and certain religious convictions (14). Moreover, there is often a relationship between condom rumor-based beliefs and willingness to use them. A cross-sectional, cluster survey conducted on 370 participants in Northern Tanzania revealed that two out of three respondents had a firm belief in at least one negative condom rumor such as condoms containing holes, causing cancer, containing HIV, or having worms (15). These themes have not surfaced in our study due to cultural differences.

Establishing a link between high-risk sexual behavior and alcohol or drug use is central for both prevention and treatment, and thus recognizing the sociodemographic profile of men visiting STD clinics is pivotal in addressing this issue. In our study, a total of 21.4% men reported using alcohol or drug before sex – a majority of them were single, unemployed individuals without children. A survey conducted in nine European cities on 16-35-year-old respondents found that men (particularly single individuals) were more commonly using drugs before sex (more specifically ecstasy to prolong sexual intercourse and cocaine to enhance sensation and arousal) (16). In a study of alcohol use and sex among men in Cameroon, a quarter of the men (25.8%) reported consummation of alcohol before their last sexual intercourse, and alcohol use was significantly associated with having extramarital sex (17).

A total of 13.4% of respondents in our study reported regular or occasional intercourses with commercial sex workers. This percentage is almost analogous to the result of a population-based question-

naire survey of 18-74-year-old men from Finland, where the overall proportion of men ever having bought sex was 14% (18). Sociodemographic characteristics linked with buying sex in the Finnish study were older age, 13-15 years of education, as well as higher income. Both our study and the study from Finland yielded a slightly higher percentage in comparison with the study by Groom and Nandwani from the United Kingdom, where 10% of 2665 men completing a standard health screening questionnaire (while attending a sexual health clinic) reported having paid for sex (19). A study from Northern Thailand showed that early first intercourse, lower socioeconomic status, as well as the usage of alcohol and drugs are all factors associated with frequent visits to commercial sex workers (20).

Despite a plethora of public health actions in our country, little attention has been paid to people's sexual behavior when outside the Republic of Croatia. Twenty four percent of subjects in our study disclosed sexual relations abroad, which is not an insignificant number, but still less when compared to some other European countries. For example, in a study conducted in Norway, 44.3% of men reported having casual sexual activity abroad (mainly in Spain, Denmark, and Greece) (21). Fifty one percent of heterosexual men and 36% of homosexual men that attended two London genitourinary medicine clinics had sex with a local foreign contact on holiday (22). Another study found that among the subjects who admitted to casual sex with a new partner abroad, 29% of them had multiple partners, which inevitably increases exposure to sexually transmitted infections (23).

Urethral swabs taken from the subjects in our study were tested for five pathogens, with the most common isolate being *U. urealyticum* (followed by *C. trachomatis*, *M. hominis*, *T. vaginalis*, and *N. gonorrhoeae*). For comparison, a very recent study conducted in the United States collected data from 40 STD clinics around the country (which included more than 225 thousand male patients) that described patient demographic and behavioral characteristics, STD diagnoses, and laboratory testing results (24). The prevalence of chlamydial and gonorrhoeal infections in that study was 11.5% and 5.8%, respectively, which was higher than in our study. Similarly, the prevalence of chlamydia and gonorrhoea was significantly higher in a recent study from the UK, although the prevalence of *T. vaginalis* (and most notably *U. urealyticum*) was lower in comparison to our results (25). In any case, one must consider the inevitable differences in the methodologies employed in different study designs.

CONCLUSION

Notwithstanding the fact that they are still curable, sexually transmitted infections covered in our study continue to represent a significant health, social, and economic burden in both the developed and developing world, leading to substantial morbidity and stigma. One of the main reasons of their continued presence in the population is the complex interaction of pathogens and their hosts' sociodemographic and behavioral factors. Therefore, studies such as ours that strive to identify groups at risk of infection visiting public health laboratories and STD clinics, as well as their pattern of sexual behavior, are pivotal for understanding STD transmission dynamics and subsequently implementing adequate prevention programs.

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