Chlamydia trachomatis and human papillomavirus 16 and 18 in adolescents

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SUMMARY

Adolescents represent a risk group for sexually transmitted infections. The aim of this study was to find the prevalence of *Chlamydia trachomatis* (*CT*) and *human papillomavirus* (*HPV*) in adolescents. Additionally, we wanted to know, whether the prevalence of *CT* was so high that antibiotic prophylaxis would be appropriate before termination of pregnancy. In the study we enrolled 200 adolescents: 100 came for termination of pregnancy and 100 for a contraceptive method. *CT* was isolated in 6 % in the first and in 4 % in the second group. *HPV* was positive in 26 % in the first and in 13 % in the second group (p<0.05). A 6 % prevalence of *CT* justifies the use of antibiotic prophylaxis before termination of pregnancy.

KEY WORDS

adolescents, females, sexual behavior, *Chlamydia trachomatis*, *human papillomavirus*

Introduction

From the epidemiological point of view it is necessary to emphasize that although *Chlamydia trachomatis* (*CT*) infection is asymptomatic in 50 % of women, it is transmitted to the sexual partner or to the newborn. Sexual contact is the most common way of transmission. *CT* is a leading microorganism causing genital tract infection and mucopurulent cervicitis. If the infection is not treated, it may become a chronic infection that leads to infertility, higher incidence of ectopic pregnancy, and to lower abdominal pain. In the male, *CT* is the cause of urethritis, epididymitis and prostatitis, which may lead to male infertility (1).

In the adolescent population world-wide *CT* has been isolated in variable percentages (8-40 %). Various epidemiological studies show that over the last few years, the incidence of *CT* infection has decreased, probably due to the wide use of antibiotics, especially macrolides, and to a more frequent condom use. The lower prevalence of *CT* infection registered in the countries in which annual screening has been introduced is ascribed to this fact (2).

Due to improved knowledge of molecular biology of *human papillomavirus* (*HPV*) and to its relation to precancerous and cancerous lesions of the uterine cervix, the emphasis has recently been given to the detection of *HPV* infection and rapid treatment of the consequences.

HPV infection is one of the most common sexually transmitted infections (STI), especially in adolescents who represent a high-risk group, the prevalence ranging from 20-46 % in various countries. Most *HPV* infections are short-term, lasting up to 12 months, and not leading to precancerous and cancerous lesions of the uterine cervix. The *HPV* prevalence is highest in the age group 20-24 years; it decreases up to the ages 40-45 years, after which it starts to slightly increase again (3).

In adolescents, STIs, especially an infection with *CT*, are important risk factors for subsequent infertility, whereas an infection with high-risk *HPV* genotypes may trigger a subsequent development of cervical cancer. Unfortunately, the awareness of STIs and their adverse outcomes is limited in this group (4). The aim of this study was to find the prevalence of STDs in adolescents,

Table 1. Contraceptive methods used by investigated adolescents

	Termination of pregnancy (%)	Requirement of contraceptive method (%)	Total(n)	t-test
No contraception	4 (4.0)	1 (1.0)	5	p=NS
Oral contraception	6 (6.0)	32 (32.0)	38	p<0.05
Diaphragm	0 (0.0)	1 (1.0)	1	p=NS
Condom	61 (61.0)	54 (54.0)	115	p=NS
Coitus interruptus	29 (29.0)	12 (12.0)	41	p<0.05
Total	100 (100.0)	100 (100.0)	200	

a potential relation to sexual history (early beginning of sexual life, number of sexual partners) and the use of contraceptive methods. Additionally, we tried to establish whether in adolescents the prevalence of *CT* infection is so high that it warrants prophylactic treatment before termination of pregnancy.

Patients and methods

The study was carried out at the Department of Obstetrics and Gynecology, University Medical Centre Ljubljana, Slovenia, between 1997 and 1999. We enrolled 200 adolescent females, aged 15-19 years. They were divided into two groups. In the first group we enrolled 100 adolescents, who came for termination of pregnancy, and in the second group 100 adolescents who came for starting a contraceptive method.

In all the patients gynecological, social and sexual histories were taken. On subsequent gynecological examinations, smears from the cervix and urethra were taken for culture and direct immunofluorescence (DIF) for *CT*, and cervical smear for hybridization test for the presence of *HPV* 16 and 18. After gynecological examination, blood was taken for serologic analysis for hepatitis B, HIV and syphilis.

The results obtained in each group were then compared using Student t-test. Correlations were performed using Pearson's correlation coefficient. For comparison of ordinal categorical variables Mann Whitney U test was used. Statistical significance was set at $p < 0.05$.

Results

Two hundred adolescents were enrolled in the study.

Using DIF *CT* was detected in 7 % of adolescents prior to termination of pregnancy and in 3 % of those visiting an outpatient clinic for starting a contraceptive method. Using the cultivation method *CT* was isolated in 6 % and in 4 %, respectively.

HPV 16 or 18 was detected in 26 % of adolescents in Group 1 and in 13 % in Group 2 ($p < 0.05$).

Syphilis, hepatitis B and HIV were not detected in any of the investigated adolescents.

The mean age at the first sexual intercourse was 16 years and the mean number of sexual partners 2. In both groups the patients declared to have had only one partner in the 6-month period preceding the testing.

A positive correlation was found between the number of sexual partners and *HPV* infection ($p < 0.05$).

The use of contraceptive methods in both groups is shown in Table 1

Discussion

The aim of this prospective comparative study was to find the prevalence of *CT* and *HPV* 16 and 18 in adolescent females attending the consultation for an early termination of pregnancy or for introduction of contraception.

The results of this study show that the prevalence of infections with *CT* and *HPV* 16 and 18 in adolescents are comparable to those in developed countries. This is not the case with the prevalence of HIV infection (1); we did not find cases of HIV infection in the investigated adolescent population. *CT* infection has become less frequent in developed countries and in Slovenia as well. This is very likely the consequence of timely detection and treatment of STDs, and of the wide-spread use of antibiotics, macrolides in particular. Additionally, the decreasing incidence of *CT* infection is due to a wide promotion of condom use, carried out because of the rapidly spreading HIV infection worldwide. In this study over 50 % of the subjects used condoms.

In Sweden and in the USA, screening on an annual basis was introduced in the early 1990', and the reduction of the *CT* infection from 25 % to 8-10 % is ascribed to this fact (2). To introduce screening in a certain region it is necessary to know the prevalence of *CT* in the population. Most authors agree that it is reasonable to introduce systematic screening at a prevalence > 5 %, whereas at a lower incidence it is advisable to use selective screening (5). The choice of the screening test is of utmost importance. At a rather low prevalence, highly sensitive tests should be used (6). Culture has been a gold standard for confirmation of *CT* infection for years. The shortcomings of cultivation are its high price, low sensitivity (65-80 %) and inappropriate laboratory facilities (7,8).

Direct immunofluorescence (DIF) is a highly specific, non-expensive and frequently used method for detection of *CT*. The specificity of the method is as high as 99

%, however its sensitivity is rather low in a population with the prevalence < 5 %. The results of our study show that the introduction of screening on a yearly basis for the detection of *CT* in adolescents in Slovenia is at the moment not justified. For the same reason, the systematic use of DIF method is not justified in our adolescent population. For their high sensitivity and specificity, the most appropriate method for detection of *CT* would be polymerase chain reaction (PCR) or ligase chain reaction (LCR) assay (7,8,9.10). However, these methods are expensive.

Because of the low prevalence of *CT* in our population, etiologic diagnosis and target treatment are more appropriate (11). The results of this study show that a higher prevalence of *CT* was found in the group of adolescents coming for an early termination of pregnancy (6 %) compared to that found in the control group (4 %). The 6 % incidence justifies the use of antibiotic prophylaxis with a single-dose azitromycin prior to termination of pregnancy, since it is known that untreated infection may lead to chronic infection resulting in infertility, ectopic pregnancy and lower abdominal pain.

The prevalence of *HPV* 16 and 18 in adolescents as observed in this study is comparable to the data in literature with the prevalence ranging between 20 and 46 % in various countries (3). In adolescents who were seeking termination of pregnancy, the incidence of HPV 16 or 18 was 26 %, which is twice as high as in the contraceptive group. Such an increased prevalence correlates with their sexual activities. The above-mentioned *HPV* genotypes are carriers of a malignant potential.

Recently, in some countries in order to prevent the cervical cancer the detection of high-risk *HPV* genotypes was introduced in addition to cervical cytologic smears. Information on the distribution of *HPV* genotypes in women in a certain country is of utmost importance in the selection of the most appropriate screening test for cervical pre-cancer in this country. In the near future, preventive vaccination is expected to become available.

Conclusion

Adolescents use condoms only occasionally and mostly not properly. *CT* and *HPV* represent a problem in adolescents. In prechlamydial-infected patients annual screening is recommended. A 6 % prevalence of *CT* justifies the use of antibiotic prophylaxis with azitromycin in a single dose before termination of a pregnancy.

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