Introduction
In recent years, there has been a growing global trend in the number of people with pathogens of sexually transmitted infections. There is a worldwide lack of data on the prevalence and incidence of sexually transmitted infections in the general population, especially among the high school students.

Material and Methods
We conducted a cross sectional study on attitudes and knowledge of young people about sexually transmitted infections. The survey population included young people aged 14 to 20 years attending a high school in the city of Novi Sad. The data were collected through a questionnaire.

Results
The percentage of students with signs and symptoms of sexually transmitted infections was higher among the students who did not use a condom during the last sexual intercourse compared to the students who used a condom.

Conclusion
Young people engaging in risky sexual behavior showed better knowledge about sexually transmitted infections in comparison to young people who did not engage in risky sexual behavior.

Key words: Sexually Transmitted Diseases; Sexual Behavior; Adolescent; Young Adult; Condoms; Health Knowledge, Attitudes, Practice; Schools; Surveys and Questionnaires; Risk-Taking

Summary
Introduction. In recent years, there has been a growing global trend in the number of people with pathogens of sexually transmitted infections. There is a worldwide lack of data on the prevalence and incidence of sexually transmitted infections in the general population, especially among the high school students. Material and Methods. We conducted a cross sectional study on attitudes and knowledge of young people about sexually transmitted infections. The survey population included young people aged 14 to 20 years attending a high school in the city of Novi Sad. The data were collected through a questionnaire. Results. The percentage of students with signs and symptoms of sexually transmitted infections was higher among the students who did not use a condom during the last sexual intercourse compared to the students who used a condom. Conclusion. Young people engaging in risky sexual behavior showed better knowledge about sexually transmitted infections in comparison to young people who did not engage in risky sexual behavior.

Key words: Sexually Transmitted Diseases; Sexual Behavior; Adolescent; Young Adult; Condoms; Health Knowledge, Attitudes, Practice; Schools; Surveys and Questionnaires; Risk-Taking

Sažetak
Uvod. Poslednjih godina na svetskom nivou prisutan je trend porasta broja ljudi koji su inficirani patogenima koji uzrokuju seksualno prenosive infekcije. Problem koji postoji širom sveta je nedostatak suficijentnih podataka prevalencije i incidencije seksualno prenosivih infekcija u celokupnoj populaciji, a pogotovo u srednjoškolskoj populaciji. Materijali i metode. Sproveli smo studiju preseka stavova i znanja mladih o seksualno prenosivim infekcijama. Populaciju koja je obuhvaćena istraživanjem činili su mladi starosti između 14 i 20 godina. Za uzorak su uzeti učenici jedne gimnazije u Novom Sadu. Podaci su prikupljeni pomoću upitnika. Rezultati. Kod većeg procenta učenika koji nisu koristili kondom tokom poslednjeg seksualnog odnosa uočeni su simptomi i znakovi uobičajeni za seksualno prenosive infekcije u poređenju sa populacijom studenata koji su koristili kondom. Zaključak. Mladi kod kojih je otkriveno postojanje rizičnog seksualnog ponašanja imaju bolje znanje o polno prenosivim infekcijama u odnosu na mlade ljude koji ne praktikuju rizičan seks. Ključne reči: polno prenosive bolesti; seksualno ponašanje; adolescent; mlada osoba; kondomi; znanje o zdravlju, stavovi, praksa; škole; ankete i upitnici; rizično ponašanje

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Abbreviations

STI – sexually transmitted infection
HIV – human immunodeficiency virus
AIDS – acquired immune deficiency syndrome
HPV – human papillomavirus
WHO – World Health Organization
CDC – Center for Disease Control and Prevention
GU – gonococcal urethritis
NGU – nongonococcal urethritis

including our country, is that there is insufficient data on the prevalence and incidence of STIs at the level of the entire population, and especially in the high school population. In general, accurate data on the overall prevalence and incidence of STIs, currently do not exist in any country. In some countries of the world, including Serbia, there is a program of passive epidemiological surveillance of STIs, which is mainly based on data sent by family doctors and clinical doctors to the appropriate service. A particular specificity of studies on the prevalence and incidence of STIs is that most STIs are usually asymptomatic in the beginning. Of the total number of people who suffer from STIs, only a small part seeks medical attention, and even fewer are diagnosed with STI. A research carried out by different experts estimated that around 340 million people have been infected, symptomatically or asymptomatically with some potentially curable STI [10–14]. A large number of countries have an increase in the number of people with STI, but more and more often, they suffer from more than one STI at the same time. It is particularly worrying that in most European countries, including Serbia, the number of people infected with human immunodeficiency virus (HIV), as well as the number of people who have HIV infection and syphilis at the same time, is growing or has a stable trend without the tendency to fall. On the other hand, a research conducted in the last several years in the European Union has shown that in most European countries the number of people who are asymptotically infected, but also symptomatically, infected with Chlamydia trachomatis is stable, and that the largest number of infected persons of both sexes are under the age of 25. In addition, as yet another equally important problem, there is even less data and studies related to the attitudes and knowledge of young people about STIs, although persons aged 15–25 are mostly affected with these infections [12–15]. For example, studies have shown that of the total number of women diagnosed with chlamydia, 24.1% – 27% are adolescents [9, 12]. Genital warts are a very widespread type of STI, caused by human papillomavirus (HPV); some types are considered the main causes of cervical cancer and penile carcinoma. The highest incidence of genital warts in the female population is aged between 15–24 years, and 20–29 years in the male population. People with genital warts are at greater risk of getting cervical or penile cancer compared to the rest of the population. The prevalence and infection with Herpes simplex type 2 virus is also high among young people. This infection is not curable and the special problem is that the lesions caused by this virus on the skin of genital organs increase the risk of HIV infection. A positive growing trend of people with STI in underdeveloped and developing countries is mainly due to the growing poverty of most of the population, prostitution, poor education, migration from rural to urban areas, psychoactive substances and alcohol abuse resulting in higher incidence of risky sexual behavior, rape and unwanted pregnancies. The aforementioned trend is also the consequence of the lack of developed health services and virtually non-existent prevention programs. On the other hand, in developed countries, the increase in incidence and prevalence of STIs is associated with increased abuse of psychoactive substances, alcohol and all the consequences that result from it – unprotected sex and more frequent sexual activity with more sexual partners [13–19].

The aim of the research was to gain insight into the attitudes and knowledge of the young population on STIs and to find out if young people with more knowledge on STIs rarely engage in risky sexual behavior.

Material and Methods

The aim of this cross-sectional research was to investigate the attitudes and knowledge of young people about STIs. The survey included young people aged 14 to 20, of which 99% were 15 to 19 years old. The entire sample included in the research were students of a grammar school in Novi Sad. Only students of this grammar school could participate in the investigation. The researchers excluded students who were not regular students of the previously mentioned grammar school. The total number of students in the school is 1,096. The survey covered a total of 338 students in 14 classes. The students were randomly selected as follows: 3 classes of the first, second and fourth grades, and 5 classes of the third grade. The total number of respondents who attended the first year was 92 (32.18% of the total number of pupils in the first grade), 68 students of the second grade (25.37%), 115 pupils of the third grade (43%) and 64 students of the fourth grade (23.53%).

The hypothesis was tested based on data obtained by processing and comparing data from two groups of respondents. The participants were divided based on their answers to the question whether they used a condom during the last sexual intercourse. The first group included students who used a condom (a total of 89 students), and the second group did not use a condom (a total of 18 students). The average age of the respondents in the first group was 16.97 years, and in the second it was 17.17 years. Both groups had an equal number of males and females. Data gathered from students who answered that they did not have sexual intercourse were not analyzed.

The data collection was done using printed questionnaire forms. All respondents received the same questionnaire. Respondents were given 10 minutes to independently complete the questionnaire. The questionnaire contained 31 questions. At the beginning of the questionnaire, respondents were informed about the reasons for data collection, they were given instructions for filling in the questionnaire, as well as
a notification that the questionnaire was completely anonymous. The questionnaire contained both open and closed questions. The closed type questions were: multiple checklist questions, multiple rating scale questions, multiple alternative questions, dichotomous questions. The first nine questions were selected to collect demographic data about the respondents. From 10th to 18th questions were questions on the knowledge of respondents about STIs. The rest of the questions (from 19 to 27) referred to the views of respondents about STDs, interest, the source of information on STDs, who they would turn for advice, etc. The last part of the inquiry included questions whether the respondents had a sexual relationship, whether they used a condom during the last sexual intercourse, how many sexual partners they had during the past year, and how old they were when they had their first sexual intercourse.

The data used in the survey were obtained by chi square test, t-test, mean values and proportions. The data obtained by the first two tests were processed using EduStat 2.01.

**Results**

Compared to the students who used condoms, a higher proportion of students who did not use condoms during their last sexual intercourse listed signs and symptoms of common STIs such as redness and burning sensation in the genital area, pain in the area of genital organs and burning sensation during miction, appearance of blisters and rash on genitals, as well as inflammation of the genital organs (pain, redness, swelling) (Tables 1 and 2). Only 16.95% of those in the group who used condoms listed three or more accurate signs and symptoms of STIs (including symptoms/signs of acute HIV-infection, acquired immune deficiency syndrome (AIDS) and hepatitis) (Table 3). In the second group, who did not use condoms, the percentage of respondents who listed three or more exact signs and symptoms of STIs was 38.39%, which is about 2.3 times higher than in the first group. On the other hand, in both examined groups of students, there was an equal percentage of respondents who did not list any exact symptom/sign of STIs (including symptoms/signs of acute HIV-infection, AIDS and hepatitis) accounting for about 55%. Statistical analysis of the data about the association between STIs and genital carcinomas provided by respondents from both groups showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about the knowledge of STI transmission provided by respondents of both observed groups (urban and rural population) showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about the knowledge of asymptomatic STIs showed that there was no statistically significant difference between the groups compared. Statistical analysis of the data about the attitude of the respondents about the implementation of sex education into school programs showed that there was no statistically significant difference between the compared groups. The same was found about counseling on HIV and other STIs in Novi Sad. Most students in both groups did not know whether there was counseling or where to get it (80% of the first and 87.5% of the respondents in the second group). The chi square test was used for data processing. Statistical analysis of the data about the attitude of the respondents of both groups about whether they knew enough about the types and modes of STD transmission showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about a desire of the respondents to learn more about STIs showed that there was no statistically significant difference between the groups. The same was found about the desire of respondents to learn about professional websites on the Internet where they could get more information about STIs. The chi square test was used for data processing. Statistical analysis of the data about the knowledge of asymptomatic STIs showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about the knowledge about the possibility to transmit STI by oral sex without condoms of both groups showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about the desire of the respondents to learn about the types and modes of STD transmission provided by respondents from both groups showed that there was no statistically significant difference between the compared groups. Statistical analysis of the data about the knowledge of asymptomatic STIs showed that there was no statistically significant difference between the groups compared.

**Table 1. Knowledge of sexually transmitted infections (STI) among young people**

| Sexually Transmitted Infection (STI) | Gonorrhea | Syphilis | HIV Infection | Hepatitis B and C | Genital herpes | Chlamydia |
|--------------------------------------|-----------|----------|---------------|-------------------|----------------|-----------|
| Percentage of respondents who identified STIs in the population who use condoms (%) | 27.12 | 83.05 | 94.91 | 37.29 | 32.2 | 30.51 |
| Percentage of respondents who identified STIs in the population not using condoms (%) | 55.56 | 94.44 | 100 | 61.11 | 38.89 | 55.56 |

*Legend: HIV – virus humane immunodeficijencije*
analysis of the data about the attitude towards the personal responsibility of an individual when it comes to STIs showed that there was no statistically significant difference between the groups. Statistical analysis of the data about the attitude of young people about the responsibility of parents, school and the general public towards the education of young people about STIs showed that there was no statistically significant difference between the groups compared. The chi square test was used for processing all mentioned data.

**Table 2.** Percentage of respondents who identified the signs and symptoms of sexually transmitted infections, other than HIV

| Symptoms and signs of sexually transmitted infection (STI) | Percentage of respondents who indicated the symptoms/signs of STIs in the group that used a condom during the last sexual intercourse (%) | Percentage of respondents who indicated the selected symptoms/signs of STIs in the group that did not use a condom during the last sexual intercourse (%) |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Genital itching/Svrab genitalne regije                    | 25.42                                                               | 33.33                                                               |
| Genital tingling/Osećaj peckanja u genitalijama           | 5.08                                                                | 11.11                                                               |
| Pain in the genitals/Bol u genitalijama                   | 6.78                                                                | 5.56                                                                |
| Genital pain during urination                              | 1.69                                                                | 5.56                                                                |
| Tingling sensation when urinating                         | 0                                                                  | 5.56                                                                |
| Blood during urination/Pojava krvi u urinu                | 3.39                                                                | 0                                                                  |
| Genital redness/Crvenilo genitalja                        | 5.08                                                                | 16.67                                                               |
| Genital lesions/Pojava rana na genitalijama               | 6.78                                                                | 0                                                                  |
| Genital rash/Pojava osipa na genitalijama                 | 3.39                                                                | 5.56                                                                |
| Genital blisters/Pojava plikova na genitalijama          | 5.08                                                                | 11.11                                                               |
| Genital herpes/Genitalni herpes                           | 1.69                                                                | 0                                                                  |
| Genital swelling/Oticanje polnih organa                   | 5.08                                                                | 5.56                                                                |
| Vaginal or penile discharge                               | 3.38                                                                | 0                                                                  |
| Genital itching/Svrab genitalne regije                    | 25.42                                                               | 33.33                                                               |
| Genital tingling/Osećaj peckanja u genitalijama           | 5.08                                                                | 11.11                                                               |
| Pain in the genitals/Bol u genitalijama                   | 6.78                                                                | 5.56                                                                |
| Genital pain during urination                              | 1.69                                                                | 5.56                                                                |
| Tingling sensation when urinating                         | 0                                                                  | 5.56                                                                |
| Blood during urination/Pojava krvi u urinu                | 3.39                                                                | 0                                                                  |
| Genital redness/Crvenilo genitalja                        | 5.08                                                                | 16.67                                                               |
| Genital lesions/Pojava rana na genitalijama               | 6.78                                                                | 0                                                                  |
| Genital rash/Pojava osipa na genitalijama                 | 3.39                                                                | 5.56                                                                |
| Genital blisters/Pojava plikova na genitalijama          | 5.08                                                                | 11.11                                                               |
| Genital herpes/Genitalni herpes                           | 1.69                                                                | 0                                                                  |
| Genital swelling/Oticanje polnih organa                   | 5.08                                                                | 5.56                                                                |
| Vaginal or penile discharge                               | 3.38                                                                | 0                                                                  |

**Legenda:** HIV – virus humane imunodeficijencije

**Table 3.** Percentage of respondents who listed the symptoms/signs of acute HIV infection

| Symptoms and signs of acute HIV infection | Percentage of respondents who listed the symptoms/signs of HIV infection in the group that used a condom during the last sexual intercourse (%) | Percentage of respondents who indicated the signs/symptoms of HIV infection in the group that did not use a condom during the last sexual intercourse (%) |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Fever/Temperatura                       | 1.69                                                                | 0                                                                  |
| Exhaustion/Malaksalost                  | 6.78                                                                | 5.56                                                                |
| Headache/Glavobolja                     | 1.69                                                                | 5.56                                                                |
| Nausea/Mučnina                          | 3.39                                                                | 5.56                                                                |
| Vomiting/Povračanje                     | 0                                                                  | 0                                                                  |
| Diarrhea/Dijareja                       | 0                                                                  | 0                                                                  |
| Muscle pain/Bol u mišićima              | 3.39                                                                | 0                                                                  |

**Legenda:** HIV – virus humane imunodeficijencije
The data from Table 4 were statistically processed using the T-test. Since $U_a = -1.96 < U_0 < U_a = +1.96$, the zero hypothesis was accepted with a probability of 95%. It indicated that the difference in the average age at first intercourse between the group of students who used a condom during the last sexual intercourse and the group that did not use a condom was not statistically significant. The average age at first intercourse was almost identical in students of both groups and it was 15.96 years in the first group, and 15.7 in the second group.

Table 4. Age of the examinees at first sexual intercourse  
Table 4. Prikaz starosti ispitanika prilikom ulaska u prvi seksualni odnos

| The age at first sexual intercourse | The number of students who used a condom at the last sexual intercourse | The number of students who did not use a condom at the last sexual intercourse |
|-----------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Uzrast pri stupanju u prvi seksualni odnos | Broj učenika koji su koristili kondom prilikom poslednjeg seksualnog odnosa | Broj učenika koji nisu koristili kondom prilikom poslednjeg seksualnog odnosa |
| 12                                | 0                                                                       | 1                                                                        |
| 13                                | 2                                                                       | 0                                                                        |
| 14                                | 5                                                                       | 2                                                                        |
| 15                                | 8                                                                       | 4                                                                        |
| 16                                | 19                                                                      | 5                                                                        |
| 17                                | 18                                                                      | 3                                                                        |
| 18                                | 2                                                                       | 2                                                                        |

Table 5. The number of sexual partners of the respondents in the last calendar year  
Table 5. Broj seksualnih partnera koje je ispitanik imao tokom posljednje kalendarske godine

| The number of sexual partners in the past year | Percentage of young people who used a condom during the last sexual intercourse (%) | Percentage of young people who did not use a condom during the last sexual intercourse (%) |
|-----------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Broj seksualnih partnera u toku prošle kalendarske godine | Procent mladih koji su koristili kondom u toku poslednjeg seksualnog odnosa (%) | Procent mladih koji nisu koristili kondom u toku poslednjeg seksualnog odnosa (%) |
| 0                                            | 0                                                                                  | 11.11                                                                                    |
| 1                                            | 58.62                                                                              | 27.78                                                                                    |
| 2                                            | 25.14                                                                              | 33.33                                                                                    |
| 3                                            | 8.62                                                                               | 11.11                                                                                    |
| 4                                            | 0                                                                                  | 0                                                                                        |
| 5                                            | 0                                                                                  | 5.55                                                                                    |
| >5                                           | 8.62                                                                               | 11.11                                                                                    |

Discussion

Differences in knowledge and attitudes of young people about STIs depend on a number of factors. Among other things, they can be explained by people’s belonging to a particular socio-economic group [20–22]. The socio-economic group is defined by 3 parameters, the person’s level of education, his occupation, and income level [18, 23]. Although this study did not examine the income level of the respondents and people who supported them, the common thing among them was that they attended the same grammar school, so they had the same level of education. However, some studies have shown that there are significant differences within the same socio-economic group in knowledge about STIs, but also in the level of individual activity and their tendency to engage in risky sexual behavior [7]. The aforementioned differences can be the result of individual personality traits, but also of possible family violence and other traumas that a person experienced during childhood or youth [24]. There are studies that found that those who were abused or abandoned in childhood engaged in sexual intercourse earlier and were more likely to change sexual partners and have sex without a condom than their peers who had not had such traumatic experiences [24, 25]. In the conducted research, the average age of the first sexual intercourse ranges from 12 to 18 years of age, and the number of sexual partners during a year varies greatly - from no sexual partner to more than five partners. Attention should be paid to the great influence young people have on their peers, especially when it comes to sexual activity [26]. Young people are more open to asking questions about STIs and are more willing to accept information from their peers about the types or ways of STI transmission. In addition, public figures who are being recognized by young people as role models and whose lifestyle and behavior they follow also have a significant role in developing attitudes about a number of issues, including the use of mechanical protection during sexual intercourse. The
importance of public personalities in adopting healthy forms of behavior in adolescents and young people has long been recognized and exploited for drug prevention, smoking and recent STI prevention programs [14]. In our country, there is a need for famous people to promote the use of condoms as a form of protection from STIs and unwanted pregnancy. The need for further promotion and dissemination of knowledge about the importance of using condoms is also reflected in the example of this study, since it has been established that out of the total number of young people covered by the survey who stated that they had sexual intercourse, 23% claimed they did not use a condom during their last sexual intercourse. This percentage is far below the percentage of young people who do not use condoms in sexual relationships in other countries, for example Malaysia or Jamaica [13, 14]. Generally, most young people globally do not use condoms during sexual intercourse [13, 14, 19].

Subjects who claimed that they did not use a condom during their last sexual intercourse, listed more accurate symptoms of classic STIs such as itching, redness and pain in the genital area, pain during urination, compared to those students who used condoms. Furthermore, most of the symptoms mentioned are the usual clinical manifestations of urogenital infections with chlamydia trachomatis, mycoplasma hominis or ureaplasma. Also, listing chlamydia as a STI can be the result of better knowledge of respondents and of fear or concern for their own health resulting from unprotected sexual intercourse. People who do not use condoms are at a greater risk of getting STIs, especially those that are most widespread, and in case of Vojvodina, they are primarily genital warts and urogenital infections with mycoplasma. A common occurrence is that, when a person gets an infection, he or she asks and learns more about it from those who are healthy, and this might be the reason why more students who did not use condoms answered questions about the types of STIs and their clinical manifestations correctly.

Urethritis is the most common manifestation of STIs in male individuals. During the last 20 years, the incidence of gonococcal urethritis (GU) has declined significantly in developed countries, but the incidence of nongonococcal urethritis (NGU) has remained high and has not changed. In most environments, chlamydia trachomatis accounts for about 40% of detected and treated NGU cases. Herpes simplex virus and trichomonas vaginalis account for much lower percentages compared to chlamydia trachomatis. One of the possible etiological agents of NGU is ureaplasma urealyticum, as well as coliform bacteria (e.g. escherichia coli). The diagnosis of male urethritis, in most cases of clinical practice, does not include specific tests except for neisseria gonorrhoeae and chlamydia trachomatis. Inflammation of the lower urinary and genital tracts in females is usually caused by coliform bacteria, mostly escherichia coli. However, STI agents should also be taken into account, as the infection with escherichia coli manifests the same as STIs.

It is generally accepted that men are more inclined to engage in sexual intercourse without using condoms, with more sexual partners, and have sex with prostitutes than women [27]. The research showed that there is an equal number of young people of both sexes who do not use condoms as a protection against STIs. The most common reason they give for not using condoms during a sexual intercourse is that they have a permanent sexual partner who they believe is faithful and has no STI, because they look healthy and have no changes on the sexual organs [28]. Some of the girls whose partners do not use a condom during sexual intercourse think that they do not need it because they use oral contraceptives [28].

An interesting outcome of the study is that the best known STI is HIV infection, while many students have never heard of other STIs, such as genital chlamydiae or hepatitis B and C. This result is, firstly, due to lectures and workshops on HIV infection and prevention of HIV/AIDS. Secondly, in the public, primarily on television and radio, of all STIs, the most talked about is HIV infection, although this infection is not widespread in the population of Vojvodina. Most young people are interested in learning more about STIs and are ready to attend classes on this topic and use the Internet as a health care tool.

There is still a pronounced stigmatization and harsh criticism of persons with STIs throughout the world. Such persons are often characterized as irresponsible, promiscuous and sexually hyperactive, and thus they are believed to deserve to have STIs. [6] As far as our research is concerned, most young people think that people with STIs should not be disgruntled, but that people are often, not completely, to blame for getting STIs. Changes in attitudes towards STIs are mainly the result of education, but also personal experience of individuals. The progress made in reducing stigma towards persons suffering from STIs is insufficient and further efforts need to be made by individuals, non-government and government organizations in order to fight to reduce stigma associated with STIs.

**Conclusion**

Young people who have been exposed to risky sexual behavior (sex without a condom) showed more knowledge about sexually transmitted infections than young people who did not engage in risky sexual behaviors.

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