








Sexually transmitted infections. Belarusian students' contemporary perspectives on the problem

Infekcje przenoszone drogą płciową. Współczesne spojrzenie na problem przez studentów z Białorusi

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Słowa kluczowe: wiedza, studenci, Białoruś, zakażenia przenoszone drogą płciową, choroby przenoszone drogą płciową, HIV, AIDS.

Abstract

Introduction: Belarusian students' awareness of sexually transmitted infections (STIs) is underreported.

Aim of the research: To assess the knowledge of student adolescents on preventive and clinical issues related to STIs.

Material and methods: The survey was conducted in February 2023 among 569 Grodno University students using a proprietary online questionnaire. The region was chosen due to its border location.

Results: The respondents were aware of the reasons for the prevalence of STIs, clinical symptoms, and prevention methods. However, a lack of awareness of the problem globalisation was noted among 14.4%. One in 10 respondents indicated atypical routes of STI infection. The main source of knowledge was the Internet (66.7%). At the same time, sources of information such as question-and-answer sessions with health care professionals and teachers were frequently cited. About half of the male and a quarter of the female students were already sexually active. Most of them had partnerships outside of marriage. Sexual initiation at the age of 15–17 years was declared by half of the men and a third of the women. The survey found low levels of students' knowledge of HIV pre-exposure prophylaxis (PrEP).

Conclusions: Awareness of STIs should be considered high. However, this does not reduce the urgency of the problem, as there is often a lack of knowledge about STIs. Women were more cautious about STIs, associating it with their personal safety. There was a general tendency among both sexes to engage in risky sexual behaviour, which is key to the high prevalence. Appropriate monitoring studies aimed at evaluating the effectiveness of sex education are needed.

Streszczenie

Wprowadzenie: Świadomość białoruskich studentów na temat infekcji przenoszonych drogą płciową (STI) jest skromnie prezentowana w piśmiennictwie.

Cel pracy: Ocena wiedzy młodzieży studenckiej dotyczącej zagadnień profilaktycznych i klinicznych związanych z STI.

Materiał i metody: Badanie przeprowadzono w lutym 2023 roku wśród 569 studentów grodzieńskich uniwersytetów za pomocą autorskiego kwestionariusza udostępnionego internetowo. Wybór regionu wynika z jego przygranicznego położenia.

Wyniki: Większość respondentów była świadoma objawów klinicznych i metod zapobiegania STI. Około połowy studentów oraz 1/4 studentek pozostawała aktywna seksualnie. Inicjację seksualną w przedziale wiekowym 15–17 lat zadeklarowała połowa mężczyzn oraz 1/3 kobiet. Mężczyźni zdecydowanie częściej niż kobiety zgłaszali posiadanie co najmniej 4 partnerek lub partnerów seksualnych (tj. 22,9% i 5%). Co 7. badana osoba, tj. 14,7%, wskazała, że nie stosuje żadnej antykoncepcji, w tym barierowych środków ochrony przed STI. Niemal wszyscy respondenci wyrazili nieufność wobec instytucjonalnej edukacji seksualnej w aspekcie praktycznych informacji na temat bezpieczeństwa seksualnego.

Wnioski: Ogólnie świadomość na temat STI należy uznać za wysoką. Nie zmniejsza to jednak pilności problemu, ponieważ często brakuje wiedzy na temat etiologii, epidemiologii i objawów klinicznych STI. Kobiety były bardziej ostrożne w kwestii STI, wiążąc to ze swoim bezpieczeństwem osobistym. Wśród przedstawicieli obu płci zaobserwowano ogólną tendencję do podejmowania ryzykownych zachowań seksualnych, które są kluczowe dla wysokiego prawdopodobieństwa rozpowszechnienia STI. Konieczne jest przeprowadzenie odpowiednich badań ukierunkowanych na ocenę skuteczności edukacji seksualnej.

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Introduction

The emergence and spread of sexually transmitted infections (STIs) is largely determined by adjustable social risk factors and the effectiveness of informative and educational efforts that are usually addressed to young people [1]. STIs are infections transmitted from person to person through sexual contact. It should be emphasised that despite the progress made in the field of medicine and preventive knowledge, these diseases still pose a very important threat to health and life, also due to long-term health effects (sometimes affecting many organs and systems), and science remains helpless against some of them [2]. STIs significantly contribute to social and health problems globally [3]. There are about 30 known infections that can be transmitted through sexual contact [4]. Studying the factors that has influence on their prevalence, i.e. attitudes, sexual behaviour, and level of education, is necessary to clarify the epidemiological situation and undertake most optimal preventive strategies [5]. People's awareness of preventive measures and their choice of healthy sexual strategies play a key role [6]. Sociological studies have shown that 28–30% of students are still willing to engage in one-night stands, with at least 20% of them having more than 3 sexual partners per year [7].

STIs can be divided into treatable infections and infections with limited or no treatment options [8]. Infections with human immunodeficiency virus (HIV), genital herpes virus (HSV2), hepatitis B virus, and human papilloma virus (HPV) are incurable [9]. However, most STIs such as gonorrhoea, syphilis, trichomoniasis, chlamydia and mycoplasma infections, scabies, pubic lice, etc., can be effectively managed with prompt medical intervention [10]. If left untreated, they can have serious consequences in the form of neurological complications, cardiovascular diseases, infertility, ectopic pregnancy, or increased risk of HIV infection [11]. Globally, between 20% and 50% of STI cases occur in population aged 15–49 years [12]. In 2020, the WHO estimated that 374 million new infections with 1 of 4 STIs: chlamydia (129 million), gonorrhoea (82 million), syphilis (7.1 million), and trichomoniasis (156 million). WHO's current prevention and treatment approaches are guided by the "Global Health Sector Strategies on HIV, viral hepatitis, and sexually transmitted infections for 2022–2030" [13].

Changes in the dynamics of STI incidence rate are related to several factors, mainly social [14]. Thus, young age is a predisposing factor for the wider spread of STIs in societies [15]. The WHO defines adolescents as individuals in the 15–24 years age group. The importance of health issues in this population is extremely high, first of all due to their special behavioural and social vulnerability, and second because people in this age group have reproductive potential for years to come [16]. By the end of the 20th century, 60–70% of STI cases were diagnosed in this age group. After

the collapse of the Soviet Union, there was a significant spread of STIs in the Republic of Belarus, mainly among young people [17]. The lack of an adequate STI prevention system in youth collectives has also played a negative role in shaping the epidemiological situation [18]. Over the next 15–20 years, new approaches have been incorporated in STI prevention for special populations [19]. This was especially true for prevention programmes to popularize sex education and safe sexual behaviours among young people [20].

The overall incidence of STIs has been declining in Belarus in recent years, from 1729.9 cases per 100,000 population in 2006 and 1454.6 in 2010 to 185.9 cases in 2019 [21]. By 2022, the number of STI cases had further decreased to 140.6 per 100,000 population, which was due to improved quality of diagnosis, anonymous STI screening sites, serological testing among key groups (i.e. blood donors, pregnant women, inpatients), and the introduction of international guidelines for primary STI prevention. The incidence of gonorrhoea and trichomoniasis dropped by 77.9% and 64.1%, respectively, over the past 2 decades, especially among women [22]. However, there has been some trend toward an increase in the incidence of syphilis by an average of 9% over the past 3 years. Thus, the incidence rate was 12.1 cases per 100,000 population in 2022 (vs. 11.1 in 2021 and 8.1 in 2020). Once again, this confirms that reduction in the incidence of STIs remains a major challenge for society and public health. Providing adequate information to adolescents as a target group about risks and preventive measures is a prerequisite for reducing the incidence of STIs among the general population. Providing adequate information about infection-associated risks and preventive measures to adolescents as a target group is a prerequisite for reducing the incidence of STIs among the general population. Identification of the key social and educational aspects that shape awareness among students is essential for developing effective prophylactic programmes and timely measures to prevent the spread of STIs.

Data on research assessing the level of knowledge on STIs among students in Belarus are very modest in the known literature from the last decades [23]. Two of our full-length papers on this topic date back to 2012 [24] and 2018 [25]. Therefore, we decided to survey a target group of highly intellectual young people presenting a high level of biomedical knowledge on the subject.

Aim of the research

The purpose of this study was to assess the level of awareness and the effectiveness of modern knowledge of students (also by gender) on preventive and clinical aspects related to sexually transmitted diseases. The research was conducted among university students in Grodno. The study helped draw attention

Table 1. Characteristics of the study groups

Variable	Gender		Total (N = 569) M ± SD, Me, IQR or %
	Male (N = 136) M ± SD or %	Female (N = 433) M ± SD or %	
Age	18.8 ±0.97	18.9 ±1.19	18.9 ±1.14, 19, 1.0
18–19	122 (89.7)	372 (85.9)	136
20–24	14 (10.3)	61 (14.1)	433
Place of residence			
Rural	10 (7.4)	54 (12.5)	64 (11.2)
Urban ≤ 50,000	17 (12.5)	73 (16.9)	90 (15.8)
Urban 50–100,000	12 (8.8)	37 (8.5)	49 (8.6)
Urban > 100,000	97 (71.3)	269 (62.1)	366 (64.4)
Marital status			
Single	101 (74.3)	296 (68.4%)	397 (69.8)
Married	0	5 (1.2)	5 (0.9)
Partnership	35 (25.7)	135 (30.5)	167 (29.3)
Self-reported knowledge on STIs	3.87 ±1.07, 4.0, 1.0	3.85 ±0.89, 4.0, 1.0	3.85 ±0.94, 4.0, 1.0

to the problem of risky sexual behaviours, which pose a threat to public health, especially among young individuals.

Material and methods

The choice of the region was due to its border location and the need for further comparisons as part of the project “Knowledge of and attitudes to sexually transmitted infections among Polish and Belarusian society”. The study was conducted online among 569 s to fifth year students of Grodno universities, including 433 women (76.1%) and 136 men (23.9%), using a dedicated online questionnaire. The respondents were aged 18 to 24 years (Table 1).

The male-to-female ratio in the study sample was 1 : 4, reflecting the general trend of the male-to-female ratio in the medical and pedagogical faculties of Belarusian universities. The study group was a simple random sample. The representativeness of the participants allowed for discussing trends in students' awareness, including sexually active young individuals. First-year students were not included in the research because they were mostly under the age of 18 years and required parental or guardian consent to participate in the study.

The anonymous questionnaire contained 28 questions. The first part comprised socio-demographic characteristics (gender, age, place of residence, social status, education), the second part inquired about elementary knowledge of STIs, and the third part included data on respondents' sexual initiation, risky sexual behaviours, and opinions on the impact of school and university sex education on sexual initiation. The ques-

tionnaire was validated by 2 independent experts in the fields of venereology and sexology in Belarus and Poland, and a pilot survey was conducted in a group of 25 randomly selected students at the Medical University of Grodno as part of a joint international project to investigate STI awareness and knowledge among young people in the border regions of both countries. The anonymous online survey was conducted between 22 and 28 February 2023 using social media and Google Forms. Potential respondents were informed of the purpose of the study and gave their consent for participation, which was confirmed by accepting the rules of the questionnaire and answering all questions. No financial incentives or other benefits were offered for participation in the study. The survey did not collect any information to identify participants. The study was approved by the Bioethics Committee at the Medical University of Bialystok (Resolution: APK.002.431.2022). Permission was obtained from the management of the participating universities in Grodno to conduct the anonymous survey among students.

Statistical analysis

Statistical analyses were performed using Statistica 13 software (Tibco Inc., USA). The Shapiro-Wilk test was used to assess the normality of the distribution. The arithmetic mean (M), standard deviation (SD), median (Me) and Q_{75} - Q_{25} , or interquartile range (IQR), were calculated for the measured variables. Qualitative data were expressed as percentages. Analysis of differences was calculated using the *t*-test for independent samples or the non-parametric *U*-Mann-Whitney test, depending on whether the assumptions of normality

Table 2. Diseases categorised by respondents as STIs. Characteristics by gender (N; %; 95% CI)

Nosological forms (‘yes’ answer)	Gender		Pearson’s χ^2 ; p-value	Total (N = 569)
	Male (N = 136)	Female (N = 433)		
Candidiasis (thrush)	58; 42.6; (34.3–50.9)	217; 50.1; (45.4–54.8)	2.3; > 0.1	275; 48.3; (44.2–52.4)
Cervical cancer	14; 10.3; (5.2–15.4)	41; 9.5; (6.7–12.3)	0.7; > 0.1	55; 9.7; (7.3–12.1)
Hepatitis B (HBV)	73; 53.7; (45.3–62.1)	266; 61.4; (56.8–66.0)	2.6; > 0.1	339; 56.6; (52.5–60.7)
Syphilis	125; 91.9; (87.3–96.5)	401; 92.6; (90.1–95.1)	0.7; > 0.1	526; 92.4; (90.2–94.6)
Pubic lice	65; 47.8; (39.4–56.2)	205; 47.3; (42.6–52.0)	3.3; > 0.2	270; 47.5; (43.4–51.6)
Tuberculosis	9; 6.6; (2.0–10.0)	20; 4.6; (2.6–6.6)	0.8; > 0.2	29; 5.1; (3.3–6.9)
Hepatitis C	67; 49.3; (40.9–57.7)	188; 43.4; (38.7–48.1)	1.4; > 0.2	255; 44.8; (40.7–48.9)
Gonorrhoea	87; 64.0; (55.9–72.1)	235; 54.3; (49.6–59.0)	4.0; < 0.05	322; 56.6; (52.5–60.7)
HIV/AIDS	127; 93.4; (89.2–97.6)	410; 94.7; (92.6–96.8)	0.3; > 0.5	537; 94.4; (92.5–96.3)
Chlamydia	111; 81.6; (75.1–88.1)	345; 79.7; (75.9–83.5)	0.3; > 0.5	456; 80.1; (76.85–83.4)
Scabies	29; 21.3; (14.4–28.2)	71; 16.4; (12.9–19.9)	1.7; > 0.2	100; 17.6; (14.5–20.7)
Asthma	5; 3.7 (0.5–6.9)	1; 0.2; (0.7–3.3)	11.8; < 0.01	6; 1.1; (0.2–2.0)

of the distribution of the results were met. Pearson’s χ^2 coefficient was used for comparative analysis. Correlations between qualitative variables were calculated using Spearman’s rho coefficients, which measure any monotonic correlation, effect size, and values from –1 to +1 between variables. A 95% confidence interval (95% CI) was used for interval estimates of statistical parameters. Significance was set at $p < 0.05$ for all analyses.

Results

The first part of the questionnaire referred to the general perception of the problem of sexually transmitted diseases in society. When asked about the importance of STIs for public health and health care, 487 (85.6%) respondents stressed their global importance. This opinion was expressed by 377 (87.1%) women and 110 (80.1%) men. A total of 33 female respondents (7.6%) believed that STIs are mainly characteristic of developing countries. This was confirmed by almost twice as many male students (18–13.2%). A few men (about 4%) noted that this problem is limited to developed countries.

About one-third of both male and female respondents believed that STIs are exclusively sexually transmitted. In contrast, two-thirds of respondents believed

that sexual contact is the main, but not the only, route of infection. Most male and female respondents (97%) agreed that STIs can involve other human organs and systems in the pathological process.

The responses on the classification of specific nosological forms in this group of diseases were interesting from the point of view of STI awareness (Table 2). All respondents were familiar with the term “sexually transmitted infections.” HIV/AIDS and syphilis (94.4% and 92.4%) were most frequently indicated as the most common STIs, then chlamydia came second (80.1%), and then gonorrhoea and hepatitis B (HBV) (56.6% each). The cumulative percentage exceeded 100% because more than one answer could be selected. Significant gender differences were noted only in the identification of gonorrhoea as an STI, with men more likely to classify this disease as an STI. This can be explained by the often ambiguous clinical picture of this disorder in women and clearly expressed symptoms of urethritis in men.

For unknown reasons, a few students incorrectly classified tuberculosis and asthma as STIs (5.1% and 1.1%, respectively).

The aetiological factors of STIs most frequently mentioned by respondents were viruses (83%), and

Table 3. STI symptoms rated by respondents (abs; %; 95% confidence interval – 95% CI)

Typical STI symptoms ('yes' answer)	Gender		Pearson's χ^2 ; <i>p</i> -value	Total (N = 569)
	Male (N = 136)	Female (N = 433)		
Genital discharge	121; 89.0; (83.7–94.3)	404; 93.0; (90.6–95.4)	2.6; > 0.1	525; 92.3; (90.1–94.5)
Inflammatory perineal lesions	125; 91.9; (87.3–96.5)	421; 97.2; (95.7–98.8)	7.54; < 0.001	546; 96.0; (94.4–97.6)
Pharyngeal pain	17; 12.5; (6.9–18.1)	41; 9.5; (6.7–12.3)	1.0; > 0.3	58; 10.2; (7.7–12.7)
Burning, pruritus	112; 82.4; (76.0–88.8)	378; 87.3; (84.2–90.4)	2.1; > 0.1	490; 86.1; (83.3–88.9)
Joint pain	33; 24.3; (17.1–31.5)	113; 26.1 (22.0–30.2)	0.1; > 0.5	146; 25.7 (22.1–29.3)

about the same number of respondents (82.8%) pointed to bacterial aetiology. More than half of the respondents (51.8%) linked some STIs to parasites and fungi. All 4 aetiological factors were mentioned by 20% of respondents: 30 (22.1%) men and 85 (19.6%) women.

The majority of respondents indicated conventional sexual intercourse with an infected person, followed by oral sex, and close domestic contact as the main routes of infection. For syphilis, all 3 routes of infection were frequently mentioned. Atypical routes of transmission (by air, water, and food).

As for the most common symptoms of sexually transmitted infections, inflammatory lesions of the genital area were reported as typical manifestations by more than 95% of respondents. Moreover, this symptom was significantly more likely to be mentioned by women than by men (97.2% vs. 91.9%). Purulent and mucous genital discharge was the second most frequently mentioned STI symptom. It was reported by about 90% of both men and women. Burning of the mucous membranes or pruritus were suggested as the third most important aetiology (86.1%). Joint pain was cited as one of the key symptoms by 25.7% of respondents, with only every tenth young person indicating sore throat as a possible symptom of an STI (Table 3). It is worth noting that pharyngeal pain was reported as a typical manifestation by 75.9% of those who declared a risk of contracting a sexually transmitted infection during oral sex.

About 10.1% of respondents described the clinical picture of STIs as characterised only by pathognomonic symptoms, while 88% of students (including > 90% of women) considered an asymptomatic course of the disease. Overall, 80 (58.6%) men and 291 (67.2%) women pointed to the possibility of contracting STIs through oral sex ($\chi^2 = 5.1$; $p < 0.05$).

Professional lectures, talks and recommendations from medical professionals (53.8%), the Internet (68.7%), and medical literature (71.4%), including brochures and pamphlets (41.8%), were most often reported by students as sources of information on STIs

and preventive measures, which determined their opinion on STIs. Gender differences were observed only for the use of the Internet as a source of knowledge (women were more likely to use Internet data; 71.1% vs. 61.0%). The increase in the use of the Internet as the second most important source of information is associated with limited use of sources of information about STIs such as medical and popular science literature or medical professionals (correlation coefficients: $r = -0.454$, $r = -0.239$, and $r = -0.195$, respectively; $p < 0.05$).

One in 3 respondents sought information and advice from experienced friends and acquaintances. The parental role in shaping knowledge about STIs was rather limited and did not exceed 30%. About the same proportion of respondents received information from mass media (television, newspapers, and glossy magazines). A sum of responses of more than 100% could be obtained because 70% of respondents listed 3 to 8 sources.

When asked about the impact of sex education classes at school on sexual initiation, more than half of the respondents reported that they did not associate sexual initiation with learning about STIs as part of school curriculum. One in 5 respondents were undecided, while 16% of men and 7.2% of women identified sex education at school as one of the factors accelerating sexual debut. At the same time, one in 10 respondents expressed the opinion that sexual initiation was delayed and related to the preventive knowledge acquired during sex education classes at school. Almost all respondents distrusted the subject "Safety of Human Life" and analogous subjects in the first year of higher education, which, in their opinion, offer no practical guidelines on sexual safety.

Since primary prevention of STIs involves behavioural risk assessment (i.e. assessing sexual behaviours that may cause exposure to infection), the last section of the questionnaire was devoted to risky sexual behaviours. About half of the men ($n = 57$, 41.9%) and a quarter of the women ($n = 112$, 25.9%) were already

Table 4. Number of sexual partners among sexually active respondents (N; %; (95% CI))

Number of sexual partners	Gender		Pearson's χ^2 ; <i>p</i> -value	Total (N = 265)
	Male (N = 83)	Female (N = 182)		
1	47; 56.6; (45.3–66.7)	136; 74.7; (68.4–81.0)	7.11; < 0.001	183; 69.1; (63.5–64.7)
2–3	17; 20.5; (11.8–29.2)	37; 20.3; (14.4–26.1)	1.0; > 0.3	54; 20.4; (15.6–25.3)
4–5	19; 22.9; (13.9–31.9)	9; 5.0; (1.8–8.2)	–9.54; < 0.001	28; 6.4; (3.5–9.4)

Table 5. Knowledge of methods to prevent STIs (N; %; 95% CI)

STI prevention methods	Gender		Pearson's χ^2 ; <i>p</i> -value	Total (N = 569)
	Male (N = 136)	Female (N = 433)		
Condom	121 (89.0); (83.7–94.3)	404 (93.3); (92.1–96.5)	2.7; > 0.05	525 (92.3); (90.1–94.5)
Condom only	65 (47.8); (42.6–53.4)	284 (65.6); (63.2–67.9)	14.2; < 0.01	349 (61.3); (60.0–62.8)
Vaginal preparations	18 (13.2); (7.5–18.9)	77 (17.8); (14.2–21.4)	1.5; > 0.05	95 (16.7); (13.6–19.8)
Regular sexual partner only	105 (77.2); (70.2–84.3)	342 (79.0); (75.2–82.8)	0.1; > 0.05	447 (78.6); (75.2–82.0)
Regular preventive screening	112 (82.4); (76.0–88.8)	361 (83.4); (80.0–86.9)	0.1; > 0.05	473 (83.1); (80.0–86.2)
Proper personal hygiene	90 (66.2); (58.3–74.2)	312 (72.1); (67.9–76.3)	1.7; > 0.05	402 (70.7); (67.0–74.4)
Vaccinations	45 (33.1); (25.2–41.0)	114 (26.3); (22.2–30.5)	2.3; > 0.05	159 (27.9); (24.2–31.6)

sexually active. Sexual activity was denied by 304 respondents (53.4%), including 53 (39.0%) men and 251 women (58.0%) ($p < 0.01$). The age at sexual initiation ranged from 15 to 21 years. Early sexual initiation (15–18 years) was reported by 66 (48.5%) men and 137 (31.6%) women, who reported sexual debut. Sexual initiation at the age of ≥ 19 years was reported by 17 (12.5%) men and 45 (10.4%) women.

Among women after sexual initiation, 3/4 reported having one sexual partner. A younger age of sexual initiation among men was associated with a greater number of sexual partners. Men were much more likely than women to report having at least 4 sexual partners (i.e. 22.9% and 5%, respectively). The presence of 2 partners was reported by 20 out of 100 sexually active men and women (Table 4).

The number of sexual partners in the past 12 months was significantly different according to gender. Risky behaviours, i.e. having 2 or more sexual partners, were reported by 36 (43.3%) men. Although a similar situation was observed for 46 women, they accounted for only 25.2% of the group ($p < 0.05$). Lack of sexual contact in the past year was reported by more than a third of sexually active respondents, i.e. 27 (32.5%) men and 70 (38.5%) women, respectively.

The analysis of questionnaire findings on the preferences for the practical use of STI preventive methods was not performed by gender due to the lack of significant differences in responses between men and women. Using condoms, having one regular sexual partner, and personal hygiene were mentioned as the main ways to prevent STIs (Table 5).

Respondents who did not mention their sexual debut and reported lack of sexual contact were excluded from further analysis of responses to this question. As for sexually active students, high awareness of safety and prevention was shown by most respondents in this group ($n = 149$, 81.9%). This was especially true regarding the choice of condoms, which can protect against infections ($n = 220$; 83%) for both men ($n = 71$, 85.5%) and women ($n = 149$, 81.9%), respectively. According to respondents, condoms are the most common preventive measure to reduce STIs, and they were also mentioned as a way to prevent unwanted pregnancy. Among all female students whose partners used condoms, 81.0% of couples used this barrier method of contraception as the only way to protect against STIs. The concept of pre-exposure prophylaxis (PrEP) was unknown to most respondents. Only 6% of students were familiar with PrEP. Almost

every seventh respondent (i.e. 14.7%) reported that they did not use any contraception at all. Noteworthy is the low level of students' awareness of other STI prevention methods. About 5% of respondents believed that contraceptives and vaginal pills should be used to prevent infection.

When asked about having more than one sexual partner, 12.8% of respondents reported they had engaged in sexual intercourse with these partners more than once, which in turn increased the risk of contracting sexually transmitted diseases. This indicator shows a weak correlation with respondents' older age ($r = 0.22$, $p < 0.05$) and experience with sexual intercourse, including the number of partners in general ($r = 0.33$, $p < 0.05$) and in particular in the past 12 months ($r = 0.25$, $p < 0.05$).

About half of respondents (49.0%) had been diagnosed with an STI in the past, regardless of gender. Past screening for HIV was reported by 41.2% of men and 38.8% of women (39.4% in total), and syphilis 12.5% of men and 17.8% of women (16.5% in total), respectively. Both screening tests were reported by 6.9% of respondents. No differences were found by gender or sexual activity.

Discussion

The obtained results reflect the level of young people's knowledge of sexually transmitted diseases and basic STI prevention methods. The use of a large sample of Belorussian students aged 18–24 years as an example allowed us to conduct an analysis of the specifics of sexual behaviours and the possible risk of infection and spread of STIs among young people for the first time in 15 years in this country. It is important to note the high level of participation: more than 500 students voluntarily took part in the survey. The data obtained indicate that most respondents are aware of STIs' aetiology, prevalence, clinical manifestations and preventive strategies. However, some data indicated their lack of awareness about the global STI problem. As expected, almost all respondents were aware of HIV/AIDS, the routes of infection, and the lack of complete cure or vaccination against the disease. Similar data were obtained by German and Italian researchers [26, 27].

While the level of knowledge about HIV infection is gradually improving, awareness of other STIs is still not widely known in society, creating a certain gap in the preventive knowledge of young people. Cross-sectional studies in European countries showed that many young people are unknowledgeable about STIs [28, 29]. Information gaps and lack of knowledge underscore the need for intensive, long-term education [30]. Chinese researchers confirmed that students have limited knowledge of STIs and the risks associated with particular diseases, raising concerns about a possible increase in the incidence of STIs [31]. A sim-

ilar study conducted in Russia in 2018 surveyed more than 1000 students from both medical and non-medical universities. The data obtained were similar to our findings, indicating the need to work with young people to increase their awareness of STIs [22]. A Scottish study found that increasing knowledge of STIs is necessary, but interventions are not yet sufficient to improve sex education, as other factors contributing to risky behaviour (e.g. self-risk analysis, social pressure, certain social norms and rules, as well as psychosocial and demographic predictors of behaviour) need to be taken into account [32]. This reinforces the need to develop prevention programmes. GYT (get yourself tested) campaign among US college students is an example of such programmes. The GYT campaign provided US colleges and universities with the opportunity to achieve the Healthy Campus 2020 goals by prioritising STI awareness and screening among students on campus, reducing the stigma associated with STI testing, and providing colleges and universities with informational and promotional resources [33]. Our findings indicate that almost half of the young people received laboratory diagnosis. This was mainly HIV infection, whereas other STIs accounted for only 12–15% of cases.

The fact that atypical routes of STI infection (air, water, and food) were relatively often mentioned is another confirmation of the respondent's low level of awareness. Similar studies in Germany and Poland showed that despite their particular risk of contracting STIs, young people have suboptimal levels of knowledge on the epidemiology of STIs [34, 35]. Factors contributing to healthy sexual behaviours include broader knowledge and less risky behaviours, as indicated by other studies evaluating prevention programmes [36].

This study confirmed that the Internet is the most important source of information about STIs among young people, who use this tool to search for answers to their questions. On the one hand, this can lead to increased awareness, because the Internet provides updates on data and news, and greatly increases access to information, unlike conventional sources such as books and TV shows, which were the main source of information for young people at the beginning of the century. And on the other hand, conflicting and often false information on the Internet can lead to an underestimation of the STI problem. A study by Chinese researchers on the implementation of an interactive online sexual health knowledge programme has shown that it did not significantly increase condom use or prevention knowledge [37, 38]. Unfortunately, parental participation in shaping knowledge on sexually transmitted diseases was rather poor ($\leq 30\%$). Additionally, a third of respondents sought information from their peers. A survey we conducted in 2012 as part of an international scientific consortium showed that friends and acquaintances were the main source of knowledge

about STIs in Belarus for 36.5% of respondents [25]. The questionnaire showed that 55% of respondents had no conversations about sex with their parents. Counseling, education, and providing information are therefore important preventive measures to be used against the spread of STIs [39]. This is supported by the most frequently discussed implications of developing effective STI prevention interventions [40].

The data on respondents' sexual activity proved interesting. About half of the male and a quarter of female students were already sexually active, and most of them were in non-marriage partner relationships. About 50% of respondents denied sexual activity. The age of sexual initiation ranged between 16 and 17 years. Early onset of sexual activity (15–17 years) was reported by half and one-third of sexually active men and women, respectively. In Germany, the age of sexual debut is 14.9 years for female and 15.1 years for male adolescents [26]. In Poland, this age ranges between 15 and 16 years and is steadily decreasing [41, 42]. Greater sexual activity among men is associated with a higher number of sexual partners, which is also a risk factor [43]. Therefore, sexual morality norms should be included in the analysis of the determinants of adolescents' sexual behaviour along with the study of complex causal models, as indicated by the research of Polish scientists [44].

While no differences were found between men and women (with a few exceptions) in their responses to questions about the aetiology, epidemiology, and clinical presentation of STIs, the answers provided by men indicate significantly higher sexual activity of this group of respondents. They were characterised by an earlier age of sexual initiation and more sexual partners. Due to increased sexual activity among young people, research in recent years points to the advertising of abstinence prevention programmes. However, these measures do not always have the desired effect of protecting the health and lives of young people [45].

Analyses of contraceptive use among young people in selected European countries indicate that more than half of those surveyed do not use contraceptive methods. The study found frequent use of condoms as a method of protection against unwanted pregnancy and STIs [46]. Furthermore, there were no significant differences by gender. In the responses of female students whose partners used condoms, more than 80% of couples used this barrier method of contraception as the only method of protection against sexually transmitted diseases.

The characteristics of sexual knowledge and behaviour identified and discussed are important to consider when developing STI prevention programmes. There is a need for mass promotion of healthy lifestyles and sexual health, considering current trends and preferred sources of information. It is necessary to effectively disseminate relevant scientific knowledge, as well as change misconceptions about STI/HIV infection. Sex-

ual morality norms should be included in the analysis of the determinants of young people's sexual behaviours, along with research on complex causal models.

Conclusions

Young people in Belarus have a relatively high level of awareness about STIs. However, this does not reduce the urgency of the problem, as there is still a lack of knowledge about the aetiology, epidemiology, and clinical manifestations of STIs. Women were more cautious about STIs, considering their personal safety. This includes not only up-to-date knowledge, but also the use of laboratory diagnosis and practicing safer sexual behaviours.

Therefore, there is a need for relevant scientific research to assess the effectiveness of sex education and its social impact on young people, as well as detailed studies on individual psychological characteristics in the context of risky sexual behaviours among adolescents.

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Ethical approval

Bioethics Committee at the Medical University of Bialystok (Resolution: APK.002.431.2022).

Conflict of interest

The authors declare no conflict of interest.

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