Observational Study

Medicine®

OPEN

Knowledge about sexually transmitted infections among young men presenting to the Brazilian Army, 2016

A STROBE-compliant national survey-based cross-sectional observational study

Machline Paim Paganella, PhD[a,*], Leonardo Rapone da Motta, MSc[a], Aline De Gregori Adami, B.Pharm[a], Rosa Dea Sperhacke, PhD[a], Sérgio Kakuta Kato, MSc[b], Gerson Fernando Mendes Pereira, MD, PhD[c]

Abstract

Global burden of sexually transmitted infections (STIs) remains high and has a profound impact on health and lives of children, adolescents and adults worldwide. For over a decade, the Brazilian Department of Chronic Condition Diseases and Sexually Transmitted Infections and the Ministry of Defense have been conducting the Conscripts Survey aiming to assess the STI prevalence and obtain data on knowledge regarding STIs and risk factors among youth.

A cross-sectional study was conducted among conscripts across Brazil aged 17 to 22 years from August to December 2016. It included a self-reported questionnaire containing 74 questions, 25 questions related to awareness and knowledge of STIs and their associated symptoms, routes of transmission, complications and risk factors.

A total of 37,282 young men across Brazil were considered for the analysis. The majority resided in the Northeast and Southeast regions (38.9% and 30.0%, respectively), followed by the South (13.9%), North (9.7%), and Central-west (7.5%) regions. Of the conscripts, 97.2% have the knowledge they may be at risk if they do not use condoms during sex. Conscripts with a higher level of education have almost 2 times greater chance of having knowledge of having sex without a condom (OR 3.23 CI95% 2.82–3.70 $P = .000$) and sharing needles and syringes (OR 2.84 CI95% 2.62–3.07 $P = .000$) represents a risk. Those with higher education also have an almost 50% greater chance of having knowledge regarding STI transmission from mother to child (OR 1.54 CI95% 1.44–1.64 $P = .000$), and knowledge of no transmission by mosquito bite (OR 1.61 CI95%1.51–1.72 $P = .000$), by kissing (OR 1.45 CI95% 1.36–1.55 $P = .000$) or by using public toilets (OR 1.51 CI95% 1.41–1.61 $P = .000$). Television (71.8%) and internet (69.4%) are the preferred forms to obtain STIs information regardless of the level of education.

Conscripts with higher level of education have greater knowledge regarding transmission of STIs. However, there are gaps regarding their knowledge about HIV pre-exposure prophylaxis and the fact that other STIs can increase the chances of acquiring HIV.

Abbreviations: AIDS = acquired immunodeficiency syndrome, CI = confidence interval, CONEP = Brazilian National Commission of Ethics in Research, HIV = human immunodeficiency virus, HPV = human papilloma virus, MSM = men who have sex with men, OR

Editor: Haider Abdul-Lateef Mousa.

Financial support for this study was provided by the Brazilian Ministry of Health through its Secretariat for Health Surveillance and its Department of Diseases of Chronic Condition and Sexually Transmitted Infections.

The authors have no conflicts of interest to disclose.

Statement of Non-duplication: The authors certify that this manuscript is a unique submission, has not been published, in part or in full, in any form, and is not being considered for publication by any other source in any medium.

Ethics: This study was approved by the Brazilian National Commission of Ethics in Research (CONEP), register number 278.616 on May 21, 2013. This study also obtained approval from the local Institutional Review Board of the coordinating center (Universidade de Caxias do Sul, Caxias do Sul, RS, Brazil), register number 1.074.338 on May 22, 2015 and updated on February 24, 2016 (register number 1.422.093).

Data Availability Statement: The datasets generated during and/or analyzed during the present study are not publicly available due to Ministry of Health requirements but are available from the corresponding author on reasonable request.

The datasets generated during and/or analyzed during the present study are available from the corresponding author on reasonable request.

[a] Instituto de Pesquisas em Saúde (IPS), Área do Conhecimento de Ciências da Vida, Universidade de Caxias do Sul (UCS), Caxias do Sul, [b] Departamento de Saúde Coletiva. Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, RS, [c] Departamento de Doenças de Condições Crônicas e Infecções Sexualmente Transmissíveis, Secretaria de Vigilância em Saúde, Ministério da Saúde, Brasília, DF, Brazil.

[*] Correspondence: Machline Paim Paganella, Instituto de Pesquisas em Saúde (IPS), Área do Conhecimento de Ciências da Vida, Universidade de Caxias do Sul (UCS), Rua Francisco Getúlio Vargas, 1130, Bloco S – Sala 315, CEP 95070-560, Caxias do Sul, RS, Brazil (e-mail: mppagane@ucs.br)

How to cite this article: Paganella MP, da Motta LR, Adami AD, Sperhacke RD, Kato SK, Pereira GF. Knowledge about sexually transmitted infections among young men presenting to the Brazilian Army, 2016: A STROBE-compliant national survey-based cross-sectional observational study. Medicine 2021;100:22(e26060).

Received: 17 September 2020 / Received in final form: 14 April 2021 / Accepted: 29 April 2021

http://dx.doi.org/10.1097/MD.0000000000026060

= odds ratio, PCAP = Survey of Knowledge Attitudes and Practices in the Brazilian Population, SC = selection commissions, STI = sexually transmitted infection, WHO = World Health Organization.

Keywords: army, brazil, conscripts, knowledge, sexual behavior, sexually transmitted infections, young men

1. Introduction

The global burden of sexually transmitted infections (STIs) remains high. According to the *2018 World Health Organization (WHO) Report on global sexually transmitted infection surveillance*, globally, more than 1 million curable STIs occur each day.[1] Although most STIs are curable by timely and effective treatment, many are asymptomatic or go undetected, and untreated STIs may lead to serious complications, including long-term disability and death, cancer, infertility, severe medical and psychological consequences and indirectly facilitate the sexual transmission of HIV.[2–4] Young people are often viewed as being too immature to make the right decisions on important sexual health–related aspects of their lives (e.g., timing their first sexual experience, choosing their sexual partners, obtaining contraceptives). Although it is unclear whether increasing knowledge about STIs would reduce risky behaviors, such knowledge is still considered an important part of sexual health education.[2,5–7]

In 2019, the detection rate of hepatitis C in Brazil among men aged 15 to 19 years was 0.8/100,000 inhabitants and 3.7/100,000 inhabitants for men aged 20 to 24 years. The detection rate of hepatitis B among men aged 15 to 19 years was 0.8/100,000 inhabitants and 3.7/100,000 inhabitants for men aged 20 to 24 years.[8] The HIV detection rate among Brazilian young men aged 15 to 19 years was 6.0/100,000 inhabitants and 35.8/100,000 inhabitants for men aged 20 to 24 years in 2018.[9] For acquired syphilis, in 2019, there were 7370 cases in young men aged 13 to 19 years and 24,482 cases in young men aged 20 to 29 years.[10]

As these epidemics have a profound impact on the health and lives of children, adolescents and adults worldwide, it is important to verify the knowledge of the young population regarding STIs to improve healthcare strategies. Therefore, due to cultural diversity, monitoring STI knowledge in this population and adolescent sexual risk behaviors in all Brazilian regions may subsidize the formulation of policies for the prevention and control of STIs. The purpose of this analysis was to explore the knowledge and perception of conscripts towards HIV/AIDS and other STIs and to provide data that can help to develop appropriate interventions that will enable young people to adopt safer sexual practices.

For over a decade, the Brazilian Department of Chronic Condition Diseases and Sexually Transmitted Infections in collaboration with the Ministry of Defense has periodically been conducting the Conscripts Survey. A national serosurvey that aims to assess the STI prevalence and obtain data on knowledge regarding STIs and risk factors among conscripts enlisted for the Brazilian Army. Data from these surveys are used to monitor STIs trends and sexual risk behavior in young males and are also used as a proxy for estimating the prevalence of STIs among adults in the general population. This article aims to present the STI self-reported knowledge of the 8th edition of the conscript survey performed in 2016.

2. Methods

2.1. Ethics

This study was approved by the Brazilian National Commission of Ethics in Research (CONEP), register number 278.616 on May 21, 2013. This study also obtained approval from the local Institutional Review Board of the coordinating center (Universidade de Caxias do Sul, Caxias do Sul, RS, Brazil; register number 1.074.338) on May 22, 2015; this was updated on February 24, 2016 (register number 1.422.093). All participants signed a written consent form.

2.2. Subject selection and sampling

This cross-sectional study was conducted among young men across Brazil, aged 17 to 22 years, who were in compulsory enlistment for military service from August to December 2016. For the sample size calculation, the prevalence of HIV infection among young men in 2007 was estimated to be 0.12%[5] considering a 95% confidence interval and a bicaudal error of 0.04%.

In total, 39,996 conscripts were selected to participate in the survey by following a sampling plan based on stratification in two selection stages. During the 1st stage, the selection commissions (SCs) were stratified by their geographical macro regions and selected with a probability proportional to size, which was defined by the frequency of conscripts estimated to participate in 2014. This sample represented 6.2% of the total number of young men required to enroll for military service throughout the country. A total of 87 SCs representing all Brazilian states were selected to recruit conscripts for this study. During the 2nd stage, the number of conscripts to be recruited by each SC was determined according to the SC size (i.e, the conscripts were selected in a number proportional to the size of the SC). A full description of this cross-sectional study has already been published elsewhere.[11] The exclusion criteria for this study were illiterate conscripts; conscripts outside the age range of 17–22 years; lack of information regarding age, origin (municipality), and educational levels; and refusal to sign the informed consent form.

2.3. Data collection

The study included a self-reported anonymous questionnaire to ensure confidentiality of the information provided and blood sample collection for HIV, hepatitis B and C and syphilis infection testing. The questionnaire contained 74 questions and included information about social-demographic characteristics, sexual behavior practices, problems related to STI, use of licit/illicit drugs; 25 questions were related to awareness and knowledge of STIs and their associated symptoms, routes of transmission, complications and risk factors. Most of the questions pertaining to knowledge were presented as sentences with possible transmission scenarios, and participants were asked if they agreed, disagreed or did not know if the sentence was correct. For example, question #33: "The risk of HIV transmission can be reduced by using

condoms." The outcome variable used was the level of education (elementary school vs. high school/higher). The variables referring to level of education were dichotomized into elementary (up to complete elementary school) and higher education (from incomplete high school to complete higher education). All questionnaires were processed at the Instituto de Pesquisas em Saúde (Universidade de Caxias do Sul, Caxias do Sul, RS, Brazil) using OpenText TeleForm 11.1 (Waterloo, Ontario, Canada).

2.4. Statistical analysis

All analyses were performed using SPSS Statistics, version 22.0 (IBM Corp, Armonk, NY) and incorporated data weighting, clustering (as selection commissions with different sizes were included), and stratification of data. Additionally, a calibration procedure was applied for the study data according to the census distribution by population size of the city of residence (less than 80,000 inhabitants, 80,000–199,999 inhabitants, and equal to or greater than 200,000 inhabitants), and educational levels. The possible associations were tested by means of chi-square tests with Yates or Fischer correction, when appropriate. Odds ratios and confidence intervals (CIs) of 95% were calculated in bivariate analyses by logistic regression to estimate the degree of association between the outcome variable and the potential risk factors. Multivariate logistic regression analysis was used to estimate the effect of one variable while at the same time controlling the effect of the others (considering only the conscripts who self-reported having already had sexual intercourse).

3. Results

3.1. General characteristics

From the estimated sample size of 39,996 conscripts, a total of 38,247 conscripts aged 17 to 22 years were enrolled in the study; 965 (2.5%) were excluded due to the lack of information regarding age, origin (municipality), or educational level. Thus, 37,282 (93.2%) young men across Brazil were considered for the analysis. Generally, the distribution of the conscripts across regions and urban/city levels resembled that of the Brazilian population. The majority of the conscripts resided in the Northeast and Southeast regions (38.9% and 30.0%, respectively), followed by the South (13.9%), North (9.7%), and Central-west (7.5%) regions. A total of 85.8% of the conscripts fell into the category of higher education.

Table 1 provides the distributions for sociodemographic characteristics in relation to the level of education of the young men. Of note, more than half of the conscripts were 18 years old (65.4%; 24,374) and self-reported to be mixed (pardo) (42.6%; 15,821). As expected, most of the conscripts lived with their

Table 1

Association between sociodemographic characteristics and educational level. Brazil, 2016.

			Level of education			
	Total		Elementary		Higher	
Variables	N	%	N	%	N	%
Age						
17	6944	18.6	1068	20.2	5875	18.4
18	24,374	65.4	3444	65.1	20,930	65.4
19	3887	10.4	472	8.9	3415	10.7
20	1320	3.5	183	3.5	1136	3.5
21	514	1.4	65	1.2	450	1.4
22	243	0.7	56	1.1	187	0.6
Race						
Mixed (pardo)	15,821	42.6	1931	36.9	13,889	43.5
White	13,365	36.0	1630	31.1	11,735	36.8
Black	5842	15.7	1249	23.9	4593	14.4
Other	2105	5.7	427	8.2	1677	5.3
Residential status						
Live with parents or relatives	34,894	93.6	4717	89.2	30,177	94.3
Live with a partner	720	1.9	197	3.7	523	1.6
Live alone	641	1.7	115	2.2	526	1.6
Mother's education						
Never attended school	766	2.1	180	3.4	586	1.8
Partial elementary	12,287	33.1	2481	47.2	9806	30.8
Completed elementary	2459	6.6	484	9.2	1975	6.2
Partial high school	2955	8.0	237	4.5	2717	8.5
Completed high school	9503	25.6	602	11.5	8900	28.0
Higher education	5803	15.6	367	7.0	5436	17.1
Unknown	3311	8.9	903	17.2	2408	7.6
Father's education						
Never attended school	1234	3.3	300	5.7	935	2.9
Partial elementary	11,227	30.3	1758	33.6	9470	29.8
Completed elementary	2216	6.0	325	6.2	1891	6.0
Partial high school	2685	7.3	305	5.8	2380	7.5
Completed high school	8016	21.7	523	10.0	7493	23.6
Higher education	4498	12.2	365	7.0	4134	13.0
Unknown	7123	19.3	1651	31.6	5472	17.2

Table 2

Association between knowledge about forms of HIV transmission and educational level. Brazil, 2016.

	Total*		Level of Education					
			Elementary		Higher			
Knowledge regarding HIV	N	%	N	%	N	%	OR (CI 95%)	p
The risk of HIV transmission can be reduced by using condoms.	34,407	93.3	4317	85.0	30090	94.7	3.15 (2.87-3.45)	0.000
A healthy-looking person may be infected with HIV.	30,612	83.1	3451	67.9	27161	85.5	2.79 (2.61–2.99)	0.000
The risk of sexual transmission of the HIV may be reduced if a person has sex only with an uninfected, faithful partner	28,627	77.6	3832	74.5	24795	78.1	1.22 (1.14–1.31)	0.000
A person can become infected with HIV by sharing cutlery, cups or meals.	18,198	49.4	1775	35.0	16423	51.7	1.99 (1.87–2.12)	0.000
The bite of an insect, such as a mosquito, can transmit the HIV.	15,073	40.6	1607	30.7	13466	42.3	1.65 (1.55–1.76)	0.000
A person can get HIV infected by kissing	17,347	46.9	1818	34.9	15529	48.9	1.78 (1.67–1.89)	0.000
A person can get HIV infected by having oral sex.	24,591	66.4	3446	66.5	21145	66.4	1.00 (0.94–1.06)	0.924
There are HIV medicines available for use after a risk of infection situation	17,197	46.5	2231	43.0	14966	47.1	1.18 (1.11–1.25)	0.000
There are medications for HIV-negative people to take before having sex with others to prevent HIV infection?	5001	13.5	906	17.4	4095	12.9	0.70 (0.65–0.76)	0.000
Is a person who has a sexually transmitted infection more likely to get HIV?	19,462	52.7	3077	59.5	16385	51.6	0.72 (0.68–0.77)	0.000

* Total of youth who answered correctly the knowledge question.

parents (93.6%; 34,894). Regarding the educational level of the parents, the majority of them fell into an incomplete elementary level (33.1% for mothers and 30.3% for fathers), followed by completed high school (25.6% for mothers and 21.7% for fathers). The conscripts with higher education levels were also those who had parents with higher educational levels. For instance, 28% (n = 8900) of the conscripts with higher education had mothers who had completed high school, while only 11.5% (n = 602) of the youths with an elementary level of education had mothers with higher educational levels. The same profile was observed regarding conscripts and their fathers' education levels, 23.6% (n = 7493) vs 10% (n = 523), respectively. Of note, almost 32% (n = 1651) of the conscripts with elementary educational level did not know their father's level of education.

3.2. Knowledge

Table 2 presents the knowledge regarding HIV risk, routes of transmission and prevention associated with conscript's level of education. Those with a higher level of education had two times more chances of knowing that the risk of HIV transmission can be reduced by using condoms (OR 3.15 CI95% 2.87–3.45 $P = .000$), and almost triple times the chance to know that a healthy-looking person may be infected with HIV (OR 2.79 CI95% 2.61–2.99 $P = .000$). On the other hand, those with higher education levels have a 30% lower chance of knowing that there are medications for HIV-negative people to take before having sex with others to prevent HIV infection (OR 0.70 CI95% 0.65–0.76 $P = .000$) and to know that if a person has an STI, the chance to get HIV increases (OR 0.72 CI95% 0.68–0.77 $P = .000$).

Table 3 presents associations between young males' knowledge in relation to routes of STIs transmission and the level of education. Generally, "having sex without a condom" was the sentence scenario where the youths had the highest number of correct answers; in other words, 97.2% (n = 35,477) of the conscripts had the knowledge they may be at risk of getting an STI if they do not use condoms during a sexual intercourse. On

Table 3

Association between knowledge about routes of STI transmission and educational level. Brazil, 2016.

	Total*		Level of education					
			Elementary		Higher			
I can get a STI by	N	%	N	%	N	%	OR (CI 95%)	p
Having sex without a condom	35,477	97.2	4629	93.4	30847	97.9	3.23 (2.82–3.70)	0.000
Sharing needles and syringes	33,538	90.0	4205	79.5	29333	91.7	2.84 (2.62–3.07)	0.000
Bathing in rivers or beaches	25,017	71.0	2545	55.4	22472	73.3	2.21 (2.08–2.36)	0.000
From mother to child during the pregnancy, childbirth and breastfeeding	25,212	70.6	2943	62.4	22270	71.9	1.54 (1.44–1.64)	0.000
Oral sex	24,066	67.3	3028	63.6	21038	67.8	1.20 (1.13–1.28)	0.000
Eating contaminated food	21,126	59.8	2055	43.8	19071	62.2	2.11 (1.99–2.25)	0.000
Mosquito bite	15,326	43.2	1552	33.4	13774	44.7	1.61 (1.51–1.72)	0.000
Kissing	15,918	44.9	1719	37.0	14199	46.0	1.45 (1.36–1.55)	0.000
Using public toilets	14,023	39.7	1462	31.5	12560	41.0	1.51 (1.41–1.61)	0.000

* Total of young male conscripts who answered correctly the knowledge question.

Table 4.

Forms in which the conscripts would like to get information about STI, according to the level of education. Brazil, 2016.

	Total		Level of education				
			Elementary		Higher		
Where would you like to get information about STI?	N	%	N	%	N	%	OR
Television	26,773	71.8	3248	61.4	23,525	73.5	1.744
Internet	25,857	69.4	2955	55.9	22,902	71.6	1.988
School	25,533	68.5	2692	50.9	22,841	71.4	2.407
Public health service	21,563	57.8	2255	42.6	19,308	60.3	2.047
Posters, pamphlets, folders	17,360	46.6	1813	34.3	15,548	48.6	1.812
Newspapers	15,794	42.4	1852	35	13,941	43.6	1.432
Private health service	15,349	41.2	1454	27.5	13,895	43.4	2.023
Family	14,243	38.2	1552	29.3	12,691	39.7	1.583
In educational activities, events (parties, shows, etc.)	12,303	33.0	1088	20.6	11,215	35.1	2.084
Friends	11,267	30.2	1234	23.3	10,033	31.4	1.501
Radio	11,007	29.5	1283	24.3	9723	30.4	1.362
Work	10,181	27.3	1153	21.8	9028	28.2	1.41
Religious institution	6454	17.3	542	10.3	5912	18.5	1.983

the other hand, 43.2% (n=15,326) of participants correctly indicated that mosquito bites cannot transmit STIs.

All the variables studied showed an association with a higher level of education. For instance, the conscripts who had a higher level of education also had an almost 2 times greater chance of having knowledge of having sex without a condom (OR 3.23 CI95% 2.82–3.70 $P=.000$) and sharing needles and syringes (OR 2.84 CI95% 2.62–3.07 $P=.000$) represents a risk of getting STIs. Those with higher education also had an almost 50% greater chance of having knowledge regarding STI transmission from mother to child (OR 1.54 CI95% 1.44–1.64 $P=.000$), by mosquito bite (OR 1.61 CI95% 1.51–1.72 $P=.000$), by kissing (OR 1.45 CI95% 1.36–1.55 $P=.000$) or by using public toilets (OR 1.51 CI95% 1.41–1.61 $P=.000$).

The majority of the youth indicated television (71.8%) and internet (69.4%) as the preferred forms to obtain information about STIs regardless of the level of education (Table 4). Those with a higher level of education also indicated school as one of the most important places to obtain STI knowledge (71.4%). Religious institutions were the place where they would be less likely to obtain information STIs (17.3%), with the lowest rate of 10.3% vs. 18.5% when compared to individuals with elementary and higher educational levels, respectively. Conscripts with higher educational levels would prefer to obtain information about STIs in educational activities and events (parties, concerts, etc.), as opposed to conscripts with elementary education (35.1% vs. 20.6%). Additionally, 43.4% of conscripts with higher educational levels would like to find information about STIs in private health services instead of only 27.5% of conscripts with elementary education.

Table 5 shows the multivariate analysis of factors associated with forms of STI transmission among conscripts. MSM individuals (men who have sex with men) are seven times more likely to know that sharing needles and syringes is a risk factor (OR 8.77 CI95% 3.91–19.69 $P=.000$), eight times more likely to know that having sex without a condom is also a risk (OR 9.11 CI95% 2.02–41.21 $P=.004$), and they have almost three times more chances of knowing that the mother can transmit an STI during gestation, birth and breastfeeding (OR 3.81 CI95% 2.92–4.99 $P=.000$). The level of education was related to knowledge about the transmission of STIs, either through needle and syringe sharing (OR 2.45 CI95% 2.08–2.89 $P=.000$), sex without condoms (OR 1.62 CI95% 1.19–2.22 $P=.002$), from mother to child (OR 1.14 CI95% 1.01–1.29 $P=.031$) and through oral sex (OR 1.20 CI95% 1.07–1.35 $P=.003$).

4. Discussion

The Conscripts Survey was conducted as part of a series of surveys with Brazilian Army male conscripts to assess HIV prevalence and associated risk factors. The sociodemographic characteristics of the conscripts included in the study reflect the characteristics of young people who enlist for military service in Brazil.

The 2007 Conscripts Survey evaluated the knowledge and perceptions of military conscripts about STIs regarding the level of education upon enlistment in the Brazilian Army. Miranda et al identified variables inversely associated with a low level of education, such as having used a condom in the last sexual intercourse, being MSM, knowing that sex without condoms increases the risk of transmission, or stating that STI can be transmitted by mother-to-child transmission or sharing syringes/needles.[12] These variables are still associated with a lower level of education even though the number of conscripts with a higher level of education has increased over the past 10 years (65.2% of the conscripts in the 2007 survey in contrast to 85.8% in the 2016 survey). In other words, the survey still shows that knowledge of STIs transmission is substantially higher among the respondents with higher levels of education. Therefore, the population with the lowest educational level continues to be the most vulnerable and should be the object of educational policies.

The Survey of Knowledge, Attitudes, and Practices in the Brazilian Population – PCAP allowed us to investigate the knowledge, attitudes and practices of Brazilians related to HIV infection and other sexually transmitted infections (STIs). The 2013 survey found that 93.8% of the youths aged 15 to 24 years (both sexes) had the knowledge that using condoms on sexual intercourse is the best way to avoid HIV infection. Regarding the statement "a person taking AIDS drug has a lower risk of transmitting the virus to someone else", the highest agreement was 35.4% among 15- to 24-year-olds. As we found in our survey, individuals with higher education had better knowledge about the ways of HIV transmission.

Table 5.

Multivariate analysis of factors associated with forms of STI transmission among conscripts. Brazil, 2016.

Variables	Crude		Adjusted	
	OR (CI 95%)	p	OR (CI 95%)	p
Sharing needles and syringes				
Higher Level of Education	2.38 (2.16; 2.63)	0.000	2.45 (2.08; 2.89)	0.000
First sexual intercourse ≥ 15 years old	1.11 (1.01; 1.22)	0.033	1.76 (1.50; 2.06)	0.000
No use of condom in the first sexual intercourse	1.41 (1.29; 1.55)	0.000	2.03 (1.72; 2.40)	0.000
Men who have sex with men (MSM)	5.36 (3.55; 8.11)	0.000	8.77 (3.91; 19.69)	0.000
No STI history	1.70 (1.41; 2.05)	0.000	1.65 (1.26; 2.18)	0.000
More than 10 partners in life	1.01 (0.91; 1.13)	0.082	1.48 (1.22; 1.80)	0.000
More than 5 casual partners	0.49 (0.41; 0.58)	0.000	0.44 (0.36; 0.55)	0.000
Having sex without a condom				
Higher level of education	3.05 (2.57; 3.61)	0.000	1.62 (1.19; 2.22)	0.002
Men who have sex with men (MSM)	3.20 (1.71; 5.96)	0.000	9.11 (2.02; 41.21)	0.004
No STI history	3.96 (3.09; 5.08)	0.000	3.36 (2.28; 4.96)	0.000
More than 5 casual partners	0.59 (0.44; 0.81)	0.001	0.57 (0.41; 0.79)	0.001
From mother to child during the pregnancy, childbirth and breastfeeding				
Higher level of education	1.35 (1.25; 1.46)	0.000	1.14 (1.01; 1.29)	0.031
No use of condom in the first sexual intercourse	1.08 (1.02; 1.15)	0.008	1.29 (1.18; 1.42)	0.000
Men who have sex with men (MSM)	2.62 (2.23; 3.09)	0.000	3.81 (2.92; 4.99)	0.000
Oral sex				
Higher level of education	1.26 (1.17; 1.35)	0.000	1.20 (1.07; 1.35)	0.003
No STI history	0.61 (0.52; 0.71)	0.000	0.63 (0.50; 0.79)	0.000
More than 10 partners in life	1.02 (0.96; 1.09)	0.514	0.85 (0.78; 0.94)	0.001

95% CI = 95% confidence interval, OR = odds ratio.

Fontes et al studied the determinant factors of knowledge, attitudes and practices regarding STIs/AIDS and viral hepatitis among 1,208 youths aged 18 to 29 years in Brazil in 2011. They found that 40% of respondents did not consider condom use a very effective method of STIs/AIDS prevention or pregnancy and thought that in case of a stable relationship, it was not necessary to use a condom; 24% still thought that HIV/AIDS can be caught by saliva, and 15% of young people thought that malaria, dengue, leprosy or tuberculosis are STIs.[13] While we did not evaluate the exact same questions, if we compare the results of our study with the data from Fontes et al, we observe that the young population knowledge about STIs has evolved in almost a decade, as we observed that 97.2% of the conscripts had the knowledge that having sex without a condom represents a risk of becoming infected by an STI.

Gonçalves et al investigated the effect of demographic, socioeconomic, educational and family variables on HIV/AIDS knowledge among adolescents aged 11 years. They found a prevalence of wrong answers to the examined questions of 17.2% for heterosexual transmission, 44.1% for homosexual intercourse, 34.9% for needle sharing, 25.6% for kiss on the mouth and 16.2% for hugging someone with AIDS. In the adjusted analysis, lower knowledge levels were more prevalent among boys and adolescents with lower socioeconomic status and with less maternal education level among those who had not talked about sex with mother and without sexual education lessons at school. They also concluded that providing information to adolescents is essential to improve knowledge about HIV and other sexually transmitted infections, especially among young males, with lower socioeconomic status and with lower maternal education level.[14]

Caetano et al obtained data regarding sexual behavior and knowledge about STIs and HIV/AIDS among undergraduates with a mean age of 20 years. Knowledge of transmission of STIs was greater than 90% for HIV, syphilis, genital herpes, and gonorrhea and 63%–76% for HPV (Human Papilloma Virus) and genital warts. Only 25%–34% knew that HIV was transmitted by breastfeeding; 56%–60% knew that HIV was transmitted by anal sex.[15]

The study shows that the percentage of correct answers is high, meaning that the conscripts have the knowledge of how the STIs are transmitted (or can be avoided). Strategies for broadening the knowledge should not be overlooked, as they would be the first step towards the correct perception of the risk of these infections.

Our study also explored the form that young males prefer to obtain information regarding STIs, and our results show that conscripts currently prefer to obtain information on TV and the internet. In a similar survey (Subbarao et al, 2017), students of India reported that they mainly obtained STI information through the internet, newspapers, or magazines.[16] EKŞİ et al investigated the knowledge level of university students (mean age of 20 years) about STIs and found that students' sources of information related to STIs were book–magazine–newspaper (female 82.4% and male 76.5%), radio–TV (female 66.7% and male 57.1%), internet (female 37.1% and male 50.9%) and friends (female 36.7% and male 36.5%).[17]

Beyond the immediate impact of the infections, STIs may have severe repercussions on physical health as well as the psychological and social well-being of patients.[18,19] The imperative for enhancing knowledge of STIs is a strategic measure of the WHO to address the burden of disease. A previous study conducted among young students indicated that most of them had heard about STIs, but primarily HIV/AIDS rather than other types of STIs. It was reported that the students mainly obtained STI information through the Internet, newspapers, or magazines. Moreover, many people do not perceive that they are at risk of becoming infected by STIs and do not have adequate knowledge about STIs, especially in developing countries. Acquiring adequate knowledge of symptoms and about the prevention of STIs is critical to reduce the risk of sexual transmission and the prevalence of STIs.[18,20–22]

A potential limitation of the study was the exclusion of illiterate conscripts who were conscripted and then dismissed from military service. The self-reported questionnaire may also have led to losses due to inadequate responses regarding relevant information. Furthermore, although an effort was made to encourage honesty, risk behaviors related to HIV and drug use might have been underreported due to a social desirability bias.

Conscripts with higher level of education have greater knowledge regarding transmission of STIs. However, there are gaps regarding their knowledge about HIV pre-exposure prophylaxis and the fact that other STIs can increase the chances of acquiring HIV. Conscripts reported TV and internet as preferred methods for national-level STI educational programs. We believe knowledge is the best tool to prevent STIs, as it empowers youth to perceive risks and make decisions on how to protect themselves.

Acknowledgments

The authors thank Brazilian Ministry of Defense and all participants. The authors also thank Dr Célia Landmann Szwarcwald and her team at FioCruz, Rio de Janeiro, RJ, Brazil for their statistical assistance.

Author contributions

Conceptualization: Machline Paim Paganella, Gerson Fernando Mendes Pereira.
Data curation: Sergio Kakuta Kato.
Formal analysis: Sergio Kakuta Kato.
Methodology: Leonardo Rapone da Motta.
Supervision: Machline Paim Paganella.
Writing – original draft: Machline Paim Paganella, Leonardo Rapone da Motta, Aline De Gregori Adami, Sergio Kakuta Kato.
Writing – review & editing: Machline Paim Paganella, Leonardo Rapone da Motta, Aline De Gregori Adami, Rosa Dea Sperhacke, Gerson Fernando Mendes Pereira.

References

[1] World Health Organization. Report on global sexually transmitted infection surveillance, 2018. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO. Available at: https://www.who.int/reproductivehealth/publications/stis-surveillance-2018/en/. ISBN: 978-92-4-156569-1.
[2] Karamouzian M, Shahesmaeili A, Khajehkazemi R, et al. Awareness of and knowledge about STIs among nonmedical students in Iran. Int Perspect Sex Reprod Health 2017;43:21–8.
[3] World Health Organization. Guidelines for Sexually Transmitted Infections Surveillance; 1999. Available at: http://apps.who.int/iris/bitstream/handle/10665/66421/WHO_CDS_CSR_EDC_99.3.pdf?sequence=1.
[4] WHOGlobal health sector strategy on sexually transmitted infections 2016–2021. Geneva: World Health Organization; 2016.
[5] Samkange-Zeeb FN, Spallek L, Zeeb H. Awareness and knowledge of sexually transmitted diseases (STDs) among school-going adolescents in Europe: a systematic review of published literature. BMC Public Health 2011;11:727.
[6] Shamsipour M, Khajehkazemi R, Haghdoost AA, Setayesh H, KarimanMajd S, Mostafavi E. Knowledge, attitude, and practice of clerical students with respect to HIV/AIDS in Iran, 2011. J Relig Health 2016;55:26–37.
[7] Kanda K, Jayasinghe A, Silva KT, et al. Religious leaders as potential advocates for HIV/AIDS prevention among the general population in Sri Lanka. Glob Public Health 2013;8:159–73.
[8] Ministério da Saúde do BrasilBoletim Epidemiológico Hepatites Virais. 2020;Brasília, DF,
[9] Ministério da Saúde do Brasil. Boletim Epidemiológico HIV/Aids. Brasília, DF. Available at: http://www.aids.gov.br/pt-br/pub/2019/boletim-epidemiologico-de-hivaids-2019. Accessed 2019, Portuguese version.
[10] Ministério da Saúde do Brasil. Boletim Epidemiológico Sífilis. Brasília, DF. Available at: http://www.aids.gov.br/pt-br/pub/2019/boletim-epidemiologico-sifilis-2019. Accessed 2019, Portuguese version.
[11] Sperhacke RD, da Motta LR, Kato SK, et al. HIV prevalence and sexual behavior among young male conscripts in the Brazilian army, 2016. Medicine (Baltimore) 2018;97:
[12] Miranda AE, Ribeiro D, Rezende EF, et al. [Association of knowledge about STD and level of schooling among conscripts upon enlistment in the Brazilian Army, Brazil, 2007]. Cien Saude Colet 2013;18:489–97.
[13] Fontes MB, Crivelaro RC, Scartezini AM, et al. Determinant factors of knowledge, attitudes and practices regarding STD/AIDS and viral hepatitis among youths aged 18 to 29 years in Brazil. Cien Saude Colet 2017;22:1343–52.
[14] Gonçalves H, González-Chica DA, Menezes AMB, et al. HIV/AIDS transmission knowledge among adolescents aged 11 years from southern Brazil. Rev Bras Epidemiol 2013;16:420–31.
[15] Caetano ME, Linhares IM, Pinotti JA, Maggio da Fonseca A, Wojitani MD, Giraldo PC. Sexual behavior and knowledge of sexually transmitted infections among university students in Sao Paulo, Brazil. Int J Gynaecol Obstet 2010;110:43–6.
[16] Subbarao NT, Akhilesh A. Knowledge and attitude about sexually transmitted infections other than HIV among college students. Indian. J Sex Transm Dis AIDS 38:10–4.
[17] Ekşi Z, Kömürcü N. Knowledge level of university students about sexually transmitted diseases. Procedia - Soc Behav Sci 2014;122:465–72.
[18] Nguyen SH, Dang AK, Vu GT, et al. Lack of knowledge about sexually transmitted diseases (STDS): implications for STDS prevention and care among dermatology patients in an urban city in Vietnam. Int J Environ Res Public Health 2019;16:1080.
[19] Low N, Broutet NJ. Sexually transmitted infections—research priorities for new challenges. PLoS Med 2017;14:e1002481.
[20] Subbarao N, Akhilesh A. Knowledge and attitude about sexually transmitted infections other than HIV among college students. Indian J Sex Transm Dis AIDS 2017;38:10.
[21] Anwar M, Sulaiman SAS, Ahmadi K, Khan TM. Awareness of school students on sexually transmitted infections (STIs) and their sexual behavior: a cross-sectional study conducted in Pulau Pinang, Malaysia. BMC Public Health 2010;10:47.
[22] Visalli G, Picerno I, Vita G, Spataro P, Bertuccio MP. Knowledge of sexually transmitted infections among younger subjects of the city of Messina (Sicily). J Prev Med Hyg 2014;55:17–22. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4718334/.