Knowledge on post-exposure prophylaxis, sexual behavior, and vulnerabilities to HIV and other STIs among young adults in Brazil

Conhecimento sobre profilaxia pós-exposição, comportamento sexual e vulnerabilidades ao HIV e outras IST entre adultos jovens no Brasil

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ABSTRACT

Introduction: Post-exposure prophylaxis (PEP) is the use of antiretroviral drugs (ARVs) to reduce the risk of human immunodeficiency virus (HIV) infection after potential risk exposure. ARV-based interventions are recommended as part of combination HIV prevention, especially for key populations. **Objective:** The aim of this study was to measure knowledge about PEP among university students. **Methods:** A cross-sectional study was conducted on university students from the Health, Education, Exact, and Human Sciences Departments of the State University of Bahia, Brazil. Sociodemographic data, information on sexual behavior, and knowledge of PEP were collected through a standardized self-applied questionnaire. **Results:** We analyzed 1580 questionnaires, of which 66.7% (1024/1536) were from females, with a mean age of 23.9 (±6.5) years, and 35.4% (448/1264) reported irregular use of condoms and regular use was not associated with being students from the health area (p=0.44, OR 0.90, 95%CI 0.69–1.17). Regarding PEP, 28.5% (449/1578) had known about it and their knowledge was statistically associated with men who have sex with men (MSM) (p<0.01, OR 3.92, 95%CI 2.45–6.28). It was noted that 94.0% (1485/1579) did not know the time limit for starting PEP, 95.1% (1500/1578) did not know the duration of prophylaxis, and 91.1% (1437/1577) did not know where to get PEP. Finally, 0.4% (7/1578) referred to previous use and 96.6% (1488/1540) would not change their sexual behavior after knowing about PEP. **Conclusion:** PEP is a prevention strategy available for decades and is safe, effective, and cost-effective. However, it is underutilized and a lack of knowledge on PEP is one of the main obstacles to access. Among university students, there is a limited knowledge about PEP acting as a barrier in preventing new infections, which shows the need for interventions based on sexual-health education, stimulating the reduction of risk behaviors and disseminating information about combination prevention.

Keywords: Post-exposure prophylaxis. Sexual behavior. Knowledge. HIV infections. Young adults.

RESUMO

Introdução: A Profilaxia Pós-Exposição (PEP) é o uso de medicamentos antirretrovirais (ARVs) para reduzir o risco de infecção pelo vírus da imunodeficiência humana (HIV) após uma potencial exposição. Intervenções baseadas em ARV são recomendadas como parte da prevenção combinada do HIV, especialmente para populações-chave. **Objetivo:** O objetivo deste estudo foi medir o conhecimento sobre PEP entre estudantes universitários. **Métodos:** Estudo transversal realizado entre universitários dos Departamentos de Saúde, Educação, Ciências Exatas e Humanas da Universidade do Estado da Bahia, Brasil. Dados sociodemográficos, informações sobre comportamento sexual e conhecimento sobre PEP foram coletados por meio de um questionário autoaplicável padronizado. **Resultados:** Foram analisados 1.580 questionários, 66,7% (1024/1536) do sexo feminino, idade média de 23,9 (±6,5) anos, 35,4% (448/1264) relatam uso irregular de preservativo, e o uso regular não foi associado ao fato de ser estudante da área da saúde (p=0,44, OR 0,90, IC95% 0,69-1,17). Em relação à PEP, 28,5% (449/1578) já tinham ouvido falar, e seu conhecimento foi estatisticamente associado a homens que fazem sexo com homens (HSH) (p<0,01, OR 3,92, IC95% 2,45–6,28). Destaca-se que 94,0% (1485/1579) não sabiam o tempo limite para iniciar o PEP, 95,1% (1500/1578) não sabiam o tempo de duração da profilaxia e 91,1% (1437/1577) não sabiam onde conseguir o PEP. Por fim, 0,4% (7/1578) referiu uso anterior e 96,6% (1488/1540) não mudaria seu comportamento sexual após saber da PEP. **Conclusão:** A PEP é uma estratégia de prevenção disponível há décadas, segura, eficaz e de baixo custo, porém, é subutilizada e seu desconhecimento é um dos principais obstáculos ao acesso. Há um conhecimento limitado sobre PEP entre universitários, destacando-se como uma barreira na prevenção de novas infecções, o que evidencia a necessidade de intervenções baseadas na educação em saúde sexual, estimulando a redução de comportamentos de risco e disseminando informações sobre prevenção combinada.

Palavras-chave: Profilaxia pós-exposição. Comportamento sexual. Conhecimento. Infecções por HIV. Adultos jovens.

INTRODUCTION

The human immunodeficiency virus (HIV) epidemic in the 1980s intrigued the scientific community and triggered unprecedented social and economic impacts, characterized by the rapid spread, involvement of economically active young adults and men, resulting in almost imminent death[1,2]. From this background, global efforts were directed toward the development of antiretroviral drugs (ARV), as well as guaranteed access to treatment, to enable the survival of infected individuals. Currently, there is an explicit trend toward the global strategic use of antiretroviral drugs as a means of preventing new HIV infections[3].

According to the report of the Joint United Nations Programme on HIV/AIDS (UNAIDS), there is a reducing trend in the number of HIV infections worldwide, which is not happening in Brazil[4] — where an increase in incidence of 21.0% was observed between 2010 and 2018[5]. The understanding of the Brazilian epidemiological

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scenario points toward a concentrated and growing epidemic, especially among young adults aged 20–34 years[6], which supports the need for broad prevention interventions focused on young adults and key populations[7].

Regarding epidemic control, there is a worldwide convergence to implement a broad combination HIV prevention program, based on behavioral, structural, and biomedical interventions integrated to meet the specific and dynamic prevention demands of the most vulnerable populations affected[8,9]. These methods aim to expand the tools to cope with the epidemic in the various contexts of vulnerabilities, exposures, and forms of transmission, given that an isolated strategy is not enough to prevent new infections[9].

In the context of biomedical interventions, post-exposure prophylaxis (PEP), which consists of the use of antiretroviral therapy (ART) by HIV-negative individuals, is inserted to reduce the possibility of HIV infection after potential risk exposure. This is a medical urgency, which should be started preferably in the first 2 h and with a maximum limit of up to 72 h after exposure. A three-drug regimen is preferably prescribed continuously for 28 days, and adherence is an essential factor for efficacy[10,11].

The Brazilian Public Health System offer PEP for HIV since 1999. However, only in 2015, the Brazilian protocol on HIV PEP simplified the prescription of those antiretrovirals, aiming to broaden and guarantee access to the intervention. It also discouraged the classification of exposure categories (occupational accident, sexual violence, and consensual sex), considering its negative implications for access, and the indication for PEP should be reinforced in all exposures that represent a risk of transmission[11].

Although, for ethical reasons, it is not possible to perform randomized studies, the efficacy in reducing the risk of HIV infection was demonstrated in a retrospective case-control study with health care professionals after occupational exposure[12] and studies with nonhuman primate models[13]. Longitudinal studies have shown that knowledge on PEP and its use are not associated with an increase in risky sexual behavior[14,15]. Additionally, there is scientific evidence that its use is safe and cost-effective as a strategy to reduce new HIV infections[10].

It is evident that the most vulnerable populations are particularly unaware of the existence of these new strategies, which makes their adequate use impossible. Therefore, to effectively use PEP in cases of HIV risk exposure, thus breaking the chain of transmission, it is necessary to assess the level of understanding of young adults regarding PEP to guide further interventions on the subject among young adults.

OBJECTIVE

With the intention of promoting the combination HIV prevention strategies, which include PEP, added to the lack of studies evidencing the understanding of this prevention technology by the general population, this study aims to measure knowledge and practices related to PEP among young adults in a university in the State of Bahia, Brazil, while also verifying the occurrence of sexual risk behaviors for sexually transmitted infections (STIs). In addition, it seeks to identify possible barriers and factors that jeopardize effective PEP use and other strategies in confronting the HIV/AIDS and other STI epidemics.

METHODS

This was a cross-sectional, descriptive study, with a quantitative approach, carried out from August 2016 to February 2017, conducted at the Bahia State University (UNEB), Campus I, in the city of Salvador, Northeastern Brazil. A convenience sample of students from courses of Health, Education, Exact, and Human Sciences Departments were accessed, with approximately 32.0% of university students enrolled during the period of study, respecting an equitable percentage between each department. Eligibility criteria included those who were classroom course undergraduate students having an active enrollment in the institution.

A standardized self-applied questionnaire, specifically designed for this study, was voluntarily answered once by each participant, anonymously, and without consulting any bibliographic source.

Based on the university schedules, the students were visited between classes, individually approached, and invited to enroll in the research. After the participants' eligibility check, the consent form and questionnaire were given, with 5–7 min to read and answer. Finally, the questionnaires were deposited in a sealed box and opened only at the end of the day by the responsible researcher, aiming to assure the participants' anonymity.

The questionnaire included the following sociodemographic variables: age as a continuous variable; sex as masculine and feminine; an ethnic-racial characterization through self-declaration of white or non-white; and marital status classified as single or in a stable relationship. Family income was categorized into ≤2 or >2 minimum wages.

The questions regarding sexual behavior allowed the participants to inform of partners (opposite sex, same sex, or both sexes), as well as the types of sexual practices (vaginal, anal, or oral), with no differentiation between receptive or insertive practices. Regarding condom use, the participants responded about regular use (yes or no).

Regarding the PEP knowledge and its use, it was questioned whether PEP had been read or known about (yes or no). If the answer was affirmative, the participant marked the location or the means of access to this information. The time limit, in hours, between risk exposure and PEP onset (24, 48, 72, 96, or "I do not know"), and PEP duration time, in days (7, 14, 21, 28, or "I do not know"), were also addressed. Additionally, the participants were asked if they knew of any health services that offered PEP in the city of Salvador (yes or no), whether the participant ever used PEP (yes or no), and some indication criteria and situations where PEP would possibly be used (true, false, or "I do not know"). Finally, it was asked which sexual behavior would be adopted if there was a postexposure drug to avoid HIV infection (unprotected sexual intercourse followed by the postexposure drug, would not change current behavior, or would use condoms in all sexual relations).

Statistical tests were conducted using the Statistical Package for the Social Sciences (SPSS) version 20.0. Parametric and non-parametric tests were used according to the variables studied. Initially, Student's t-test was used for continuous variables such as age. Pearson's chi-square test was used to evaluate the categorical variables in bivariate analysis. Results were considered statistically significant at $p<0.05$ and confidence interval of 95% (95%CI).

This research was developed in accordance with the ethical requirements of Resolution 466/2012 of the Brazilian National Health

Council and approved by the Ethics Research Committee of the Climério de Oliveira Maternity/Federal University of Bahia (CAAE 53942916.0.0000.5543 and protocol no. 1.450.983). Each teaching department (Health, Education, Exact, and Human) of the participating university authorized the study by means of assent to the memorandum (DCV018). Informed consent was obtained from all individual participants included in the study.

RESULTS

We interviewed 1580 university students, who answered the questionnaire applied. At the final collection date, the university had 4928 students with active enrollment, meaning our sample represented 32.0% of the study population. The number of students per department was also proportionally uniform. The sociodemographic characteristics and sexual behaviors are presented in **Table 1**.

Irregular condom use was reported by 37.6% (256/681) of self-declared heterosexual women and by 71.8% (28/39) of women who had sex with only women (WHW) (p<0.01). Self-declared heterosexual men (p<0.01, OR 3.13, 95%CI 1.70–5.85), females (p<0.01, OR 1.50, 95%CI 1.17–1.92), being in a stable relationship (p<0.01, OR 7.05, 95%CI 4.96–10.01), and age >24 years (p<0.01, OR 2.06, 95%CI 1.62–2.64) were statistically associated with inconsistent condom use. There was no significant association between condom use among health students (p=0.44, OR 0.90, 95%CI 0.69–1.17).

The bivariate association of sociodemographic characteristics with PEP knowledge is described in **Table 2**. Only 28.5% (449/1578) of the participants had already known of PEP; of these, 41.9% (188/449) were health students. PEP knowledge was statistically associated with same-sex relations (p<0.01, OR 2.60, 95%CI 1.78–3.79), men who have sex with men (MSM) (p<0.01, OR 3.92, 95%CI 2.45–6.28), and health students (p<0.01; OR 2.86, 95%CI 2.25–3.63). However, there was no statistically significant association between knowledge on PEP and condom use (p=0.33). Regarding knowledge source, 42.0% (167/398) reported social media as one of the information sources (**Figure 1**). Additionally, 91.1% (1437/1577) of the students are unaware of health services that offered PEP and 0.4% (7/1578) reported previous use, as shown in **Figure 2**.

Regarding the following statement, "PEP is indicated only for key populations (gays, men who have sex with men, transvestites, sex workers)," 40.0% (632/1579) of respondents considered it false.

Table 1 – Sociodemographic characteristics and sexual behavior by area of knowledge among young adults in a university in the State of Bahia, Brazil.

	Total n (%)	Exact sciences n (%)	Human sciences n (%)	Health sciences n (%)	Education sciences n (%)
Sociodemographic characteristics					
Age					
Mean (±SD)	23.9 (6.5)	22.5 (4.9)	23.5 (5.7)	22.6 (4.1)	27.6 (9.7)
≤24 years	1,123 (72.0)	272 (80.2)	346 (70.9)	338 (82.0)	167 (52.0)
>24 years	437 (28.0)	67 (19.2)	142 (29.1)	74 (18.0)	154 (48.0)
Sex					
Female	1,024 (66.7)	143 (44.1)	276 (57.6)	353 (86.3)	252 (77.8)
Male	512 (33.3)	181 (55.9)	203 (42.4)	56 (13.7)	72 (22.2)
Color					
White	225 (14.3)	48 (14.1)	86 (17.7)	56 (13.5)	35 (10.7)
Non-white	1346 (85.7)	292 (85.9)	401 (82.3)	360 (86.5)	293 (89.3)
Stable union					
Yes	201 (12.7)	27 (7.9)	55 (11.2)	33 (8.0)	86 (25.9)
No	1376 (87.3)	314 (92.1)	434 (88.8)	382 (92.0)	246 (74.1)
Family income*					
≤2 MW	697 (44.7)	137 (40.5)	200 (41.2)	178 (43.2)	182 (56.0)
>2 MW	863 (55.3)	201 (59.5)	285 (58.8)	234 (56.8)	143 (44.0)
Sexual behavior					
Sexual relations					
With the opposite sex	1,211 (85.6)	257 (83.7)	376 (84.5)	313 (88.7)	265 (85.8)
With the same sex	121 (8.6)	29 (9.4)	36 (8.1)	28 (7.9)	28 (9.1)
Both	82 (5.8)	21 (6.8)	33 (7.4)	12 (3.4)	16 (5.2)
Sexual practices†					
Vaginal sex	1,192 (92.5)	250 (90.6)	382 (92.0)	305 (94.4)	255 (92.7)
Anal sex	360 (28.0)	84 (30.4)	128 (30.9)	76 (23.5)	72 (26.2)
Oral sex	905 (70.3)	196 (71.0)	304 (73.4)	220 (68.1)	185 (67.3)
Regular use of condom					
Yes	816 (64.6)	200 (73.0)	259 (63.5)	199 (62.8)	158 (59.6)
No	448 (35.4)	74 (27.0)	149 (36.5)	118 (37.2)	107 (40.4)

*Minimum wage from the family group; †More than one answer allowed.

Table 2 – Bivariate analysis of sociodemographic characteristics, sexual behavior, and area knowledge with prior knowledge on post-exposure prophylaxis among young adults in a university in the State of Bahia, Brazil.

	Prior knowledge on PEP		p-value
	Yes n (%)	No n (%)	
Age			
≤24 years	321 (28.6)	801 (71.4)	0.669
>24 years	120 (27.5)	316 (72.5)	
Sex			
Female	306 (29.9)	716 (70.1)	0.062
Male	130 (25.4)	382 (74.6)	
Color			
White	55 (24.4)	170 (75.6)	0.140
Non-white	393 (29.2)	951 (70.8)	
Stable union			
Yes	58 (28.9)	143 (71.1)	0.873
No	389 (28.3)	985 (71.7)	
Family income*			
≤2 MW	183 (26.3)	513 (73.7)	0.083
>2 MW	261 (30.3)	601 (69.7)	
Sexual relations			
With the opposite sex	319 (26.4)	891 (73.6)	<0.001
With the same sex	59 (48.8)	62 (51.2)	
Both	27 (32.9)	55 (67.1)	
Sexual practices†			
Vaginal sex	320 (26.9)	871 (73.1)	NA
Anal sex	123 (34.2)	237 (65.8)	
Oral sex	272 (30.1)	633 (69.9)	
Regular use of condom			
Yes	243 (29.8)	572 (70.2)	0.332
No	122 (27.2)	326 (72.8)	
Previous PEP use			
Yes	6 (85.7)	1 (14.3)	0.001
No	442 (28.2)	1127 (71.8)	
Know health services that offer PEP			
Yes	135 (96.4)	5 (3.6)	<0.001
Not	312 (21.7)	1123 (78.3)	
Area of knowledge (department)			
Education sciences	88 (26.6)	243 (73.4)	<0.001
Exact sciences	72 (21.1)	269 (78.9)	
Human sciences	101 (20.6)	390 (79.4)	
Health sciences	188 (45.3)	227 (54.7)	

PEP: post-exposure prophylaxis; NA: not applicable. *Minimum wage from the family group; †More than one answer allowed.

When questioned about the indication in situations such as sexual violence (rape) or condom breaks in sexual relations with an unknown person, 42.7% (675/1580) and 37.2% (587/1580), respectively, considered those as circumstances where PEP could be indicated.

Finally, **Table 3** shows the probable sexual behavior of the participants after knowledge on PEP: 3.4% (52/1540) stated they would have intercourse without a condom and later would use PEP; of these, 57.7% (30/52) were from the human department. However, among those who would have unprotected sex, 50.0% (26/52) had already reported irregular condom use.

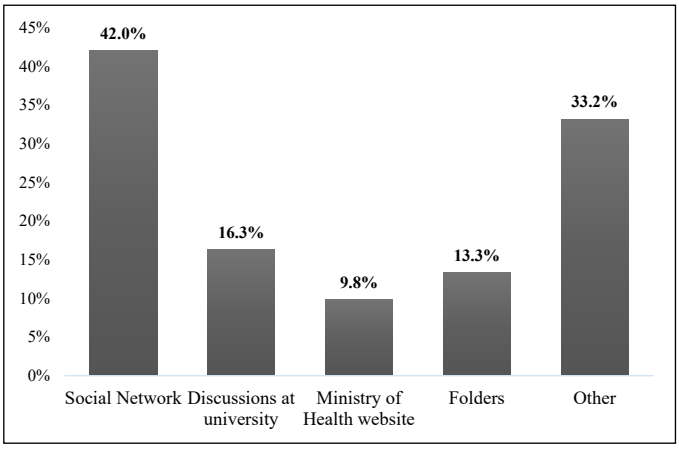

Figure 1 – Sources of information about post-exposure prophylaxis (n=398) among young adults in a university in the State of Bahia, Brazil.

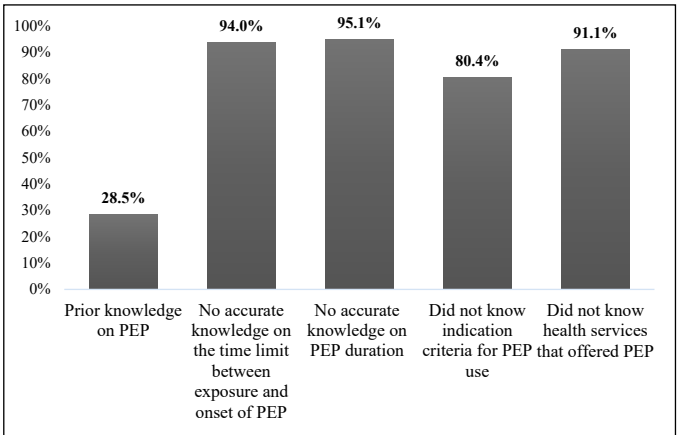

Figure 2 – Knowledge about post-exposure prophylaxis (n=1,580) among young adults in a university in the State of Bahia, Brazil.

Table 3 – Sexual behavior toward knowledge of the concept of PEP by area of knowledge among young adults in a university in the State of Bahia, Brazil.

	Total n (%)	Exacts n (%)	Human n (%)	Health n (%)	Education n (%)
Sexual behavior					
No condom use followed by PEP	52 (3.4)	10 (3.0)	30 (6.3)	8 (2.0)	4 (1.2)
No change on sexual behavior	708 (46.0)	156 (47.0)	213 (44.4)	187 (45.9)	152 (47.4)
All sexual activities with condom	780 (50.6)	166 (50.0)	237 (49.4)	212 (52.1)	165 (51.4)

PEP: post-exposure prophylaxis.

DISCUSSION

We found that less than one-third (28.5%) of the participants had already known about PEP, similar to a study of 583 residents of two high HIV prevalence districts in New York City[16], showing an unsatisfactory knowledge of this prevention strategy. Specifically in Brazil, there are few studies with the general population comparable with the data found in our study. It stands out that in a study carried out on individuals aged 15–59 years in the Brazilian cities of Campo Grande, Curitiba, and Florianópolis in 2019, knowledge about PEP was reported, respectively, by 22.1, 20.6, and 38.9% of participants[17].

Most of the studies evaluating the effects and knowledge of new prevention technologies are limited to specific populations such as MSM and transgender women. Young adults, regardless of gender identity and sexual orientation, are more exposed to new sexual experiences during the university period and some studies have already reported an increase in STIs in this population[18,19]. However, the perception of vulnerability of these young adults has not been broadly studied in our country or in Latin America.

PEP is a prevention strategy available for decades and is safe, effective, and cost-effective. However, it is underutilized and a lack of knowledge on PEP is one of the main obstacles to access[20,21]. National evidence corroborates the data from the present study on the maintenance of this scenario of the lack of knowledge on biomedical strategies[17], such as PEP, especially among the general population in medium- and low-income countries and with territorial extension such as Brazil. Knowledge and guaranteed access to strategies must be feasible for key populations as well as for general population. Barrier should be overcome since most studies on the most recent biomedical prevention strategies include mainly key populations.

The risk of HIV and other STIs is dynamic throughout life, and potential risk exposures are sometimes not predictable[21]. Therefore, PEP fits as a primary strategy in breaking the transmission chain after risk exposure. Knowledge and access to PEP, as well as to other prevention tools are an inherent part of the success of programs to prevent new infections[20]. Furthermore, PEP can be an opportunity to access new strategies, such as pre-exposure prophylaxis (PrEP)[21], and mainly health education focused on self-care, perception of vulnerability, and development of autonomy to choose the best strategy in the context individual.

In this study, knowledge about PEP among MSM was higher than that about the general population of university students evaluated. However, the rate of PEP knowledge we found was lower than that reported in previous studies in South Africa[22] and other areas in Brazil[23], which identified 73.7% and 68.0%, respectively, of MSM with information on such prevention. Some authors have found, in the United States, a lower or similar rate of knowledge on prevention among MSM than described in the present study[16,24]. A recent meta-analysis involving 12,579 MSM found that the combined estimate of the proportions of MSM who were aware of PEP was 59.9%, reinforcing the maintenance of a low-level knowledge about the strategy[25]. The engagement and education strategies undertaken by governmental and non-governmental organizations targeting the MSM population may impact the diffusion of this knowledge.

The most cited source of information for prior knowledge about PEP were social networks (e.g., Facebook, Instagram, and Twitter), reinforcing the role of these media as potential support tools in the democratization of access to information[26,27], transposing spatial barriers of communication, and enabling instant information on HIV and other STIs, through language appropriate to the target population and peer education interventions.

The lack of information on the time limit between exposure and onset of PEP, as well as on the location of health services that provide it reveals a synergistic conjuncture of barriers that compromise the access and diffusion of PEP, as has already been shown in other studies[22,24]. The lack of knowledge about PEP among young university students can impact its establishment as an effective prevention strategy in the short and long term: in the context of individual protection, the implication such as not using the tool after potential risk exposures on the graduation period; regarding the health students, the lack of knowledge on PEP not only compromises its use on occupational exposures, but may also affect the quality of the orientation for populations to be assisted in the HIV prevention aspect; and regarding education students, which are important agents in the process of health promotion, it can compromise dissemination of adequate information on educational spaces at all levels of the education system.

Only 40.0% (632/1579) of the participants in the present study considered the statement "PEP is indicated only for key populations" false. This finding suggests a perpetuation of the erroneous widespread concept in the first decade of the HIV epidemic about the existence of "risk groups", which hinders the perception of risk among young adults who do not feel they belong to these groups and, therefore, do not consider necessary prevention in situations of exposure[17]. It is worth mentioning that there are some population segments subjugated to a set of vulnerabilities, whether individual, social, or structural, which potentiates the context of susceptibility to STIs[7,9]. It should be understood that all sexually active persons are potentially exposed to the risk of HIV infection and other STIs. Therefore, access to prevention tools must be universal, free from stigma or discrimination, and guaranteed to every citizen as an inherent part of human rights[28,29].

Almost 58.0% (905/1580) of the participants in the study did not consider rape victims as a situation in which PEP could possibly be indicated, which demonstrates the negative impact of the lack of knowledge about the prevention strategy in potential situations of HIV infection. Effective measures on sexual violence prevention must be implemented, but while effective strategies are not ensured, access to measures to minimize the harm suffered by the victim must be guaranteed. Therefore, it is necessary to ensure that comprehensive care for these victims, such as emergency contraception, prophylaxis for HIV and other STIs, as well as psychological support are implemented[30,31].

Prior knowledge on PEP was not associated with the adoption of unprotected sexual practices, a finding consistent with previous studies[14,15,22], which corroborates the premise that access to PEP would not be associated with risk compensation[22,32]. Previous literature shows that the offer of PEP, combined with adequate counseling and behavioral interventions, is associated with the reduction of high-risk practices[33]. Considering the context of

combined prevention, the recurrent users of PEP are those who may benefit from PrEP[34].

The inconsistent use of condoms evidenced in the present study is consistent with the data reported in a population survey carried out by the Brazilian Ministry of Health, in which approximately 60.9% had not used a condom during the last sexual intercourse, although over 94.0% of surveyed individuals considered condoms as the most effective way to avoid HIV infection[35]. Higher rates of condom use were found among younger university students and a tendency of decline in those rates with increasing of age has also been observed. These findings are possibly related to the fact that older people are, to a greater extent, in stable relationships, a variable which has a strong association with irregular condom use, suggesting a utopic feeling of absolute protection between fixed partnerships[36]. Belonging to the health area, in this study, was not a predictor of consistent condom use, evidencing that technical-scientific information is not enough by itself, one must have a self-perception of risk and susceptibility to STIs[37].

The statistical association between the inconsistent use of condoms and the female sex can be related to a set of sociocultural factors, such as gender vulnerability and difficulty in negotiating condoms use, the taboo about woman's possession of condoms as an argument for vulgarization, rare family dialogues on sexuality, lack of incentive for vaginal condom use, and discouragement of autonomy and the feminine knowledge about their own body and pleasure[38]. These contexts show an overlapping of factors closely related to the greater susceptibility of women to HIV infection and other STIs.

Although there were higher rates of reporting regular condom use among MSM than those among heterosexual men found in our study, this is the population in which HIV infection is increasing most in Brazil[6]. This conflicting information highlights the need for more studies to understand the dynamics among this specific population and evidence of other possible associated factors. The majority of women who have sex with women (WSW) reported inconsistent condom use, which may be due to a lack of knowledge about vulnerability and a false perception of no risk, a consequence of the lack of specific prevention input available to this population as well as effective public policies directed to this segment[39,40].

Strengths

The strengths of this study are the considerable sample size and the fact that it evaluated a general population, since most studies that assess knowledge of biomedical prevention technologies are limited to key populations. In addition, the study reinforces that in addition to the existence of a wide variety of strategies, it is essential to have educational actions to ensure effective knowledge and adequate access to each of the prevention strategies for HIV and other STIs.

Limitations

The limitations of this study include those already inherent in the cross-sectional study design. In addition, worldwide, especially in Brazil, there are few studies with the general population comparable with the data found in our study.

CONCLUSION

Our results underscore the challenges to implementing biomedical HIV prevention technologies and to the effective use of the existing methods, for example, condoms. The study also demonstrates a limited knowledge on PEP among university students, evidencing access barriers in the prevention of new infections. On the contrary, unsatisfactory condom use was associated mainly with heterosexual practices, females, and fixed partnerships, which shows an overlap of factors associated with exposure to HIV and other STIs.

The fight against the HIV/AIDS epidemic needs to be based on joint actions, integrated and coordinated, with participation of civil society and public authorities. Finally, it is necessary to strengthen public policies that guarantee effective access to strategies of combined prevention, early diagnosis, timely treatment, and consequently, the breakdown of the HIV transmission chain and other STIs.

Approval by the Human Research Ethics Committee

This research was approved by the Ethics Research Committee of the Climério de Oliveira Maternity/Federal University of Bahia (CAAE 53942916.0.0000.5543 and protocol no. 1.450.983).

Participation of each author

VNS: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. EXPS: Formal analysis, Software, Writing – review & editing. MST: Formal analysis, Software, Writing – review & editing. AGAT: Methodology, Supervision, Writing – review & editing.

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Conflict of interests

The authors declare no conflicts of interest.

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