Prevalence of condom use among men who have sex with men and using HIV pre-exposure prophylaxis

Prevalência do uso de preservativos entre homens que fazem sexo com homens e usam profilaxia pré-exposição para HIV

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ABSTRACT

Introduction: Sexually transmitted infections (STIs) remain a critical global public health issue. Pre-exposure prophylaxis (PrEP), which involves the daily use of tenofovir and emtricitabine, has proven highly effective in preventing HIV transmission, especially among high-risk groups like men who have sex with men (MSM). However, PrEP usage may unintentionally reduce condom use, potentially increasing the risk of acquiring other STIs. **Objective:** The aim of this study was to describe the percentage of MSM who use PrEP and use condoms in their sexual activities. **Methods:** A cross-sectional, with a qualitative and descriptive approach, study was conducted using self-made questionnaires about PrEP usage among MSM. Data collection occurred via social media from October 2021 to May 2022, targeting 154 men aged 18–50 from Bauru, São Paulo, and its surroundings. **Results:** Of the 154 participants, 86.4% were aware of PrEP, but only 11.03% had ever used it, while 73.37% expressed willingness to use it. Among PrEP users, 5.84% reported contracting an STI during use, with gonorrhea and syphilis being the most common. Condom use was inconsistent across all groups, with only 3.24% of PrEP users and 32.46% of potential users consistently using condoms in all sexual encounters. The findings highlight significant gaps in PrEP usage and condom adherence, emphasizing the need for targeted interventions to address STI prevention and promote consistent condom use. **Conclusion:** Although PrEP is effective in preventing HIV, this study highlights its association with risky sexual behaviors, leading to higher STI rates. Comprehensive education is essential to mitigate these risks.

Keywords: Sexual and gender minorities. Pre-exposure prophylaxis. Sexually transmitted diseases.

RESUMO

Introdução: As infecções sexualmente transmissíveis (ISTs) continuam sendo um problema crítico de saúde pública global. A profilaxia pré-exposição (PrEP), que envolve o uso diário de tenofovir e emtricitabina, provou ser altamente eficaz na prevenção da transmissão do HIV, especialmente entre grupos de alto risco, como homens que fazem sexo com homens (HSHs). No entanto, o uso da PrEP pode reduzir involuntariamente o uso do preservativo, aumentando potencialmente o risco de adquirir outras ISTs. Estudos enfatizam a necessidade de programas de conscientização para abordar esses comportamentos não intencionais. **Objetivo:** Descrever a porcentagem de HSHs em uso de PrEP e que mantêm o uso de preservativos em suas atividades sexuais. **Métodos:** Foi realizado um estudo transversal, com abordagem qualitativa e descritiva, utilizando questionários autoelaborados sobre o uso de PrEP entre HSHs. A coleta de dados ocorreu via mídia social, de outubro de 2021 a maio de 2022, com 154 homens de 18 a 50 anos de Bauru, São Paulo, e arredores. **Resultados:** Dos 154 participantes, 86,4% estavam cientes da PrEP, mas apenas 11,03% já a usaram, enquanto 73,37% expressaram disposição para usá-la. Entre os usuários da PrEP, 5,84% relataram contrair uma IST durante o uso, sendo gonorreia e sífilis as mais comuns. O uso de preservativo foi inconsistente em todos os grupos, com apenas 3,24% dos usuários da PrEP e 32,46% dos usuários em potencial usando preservativos consistentemente em todos os encontros sexuais. As descobertas destacam lacunas significativas no uso da PrEP e na adesão ao preservativo, destacando a necessidade de intervenções direcionadas para abordar a prevenção de ISTs e promover o uso consistente de preservativo. **Conclusão:** Embora a PrEP seja eficaz na prevenção do HIV, este estudo destaca sua associação com comportamentos sexuais de risco, levando a maiores taxas de ISTs. A educação abrangente é essencial para mitigar esses riscos.

Palavras-chave: Minorias sexuais e de gênero. Profilaxia pré-exposição. Infecções sexualmente transmissíveis.

INTRODUCTION

Sexually transmitted infections (STIs) are defined as infections caused by bacteria, viruses, and other microorganisms, primarily transmitted through sexual contact[1]. These infections continue to pose a significant threat to global public health, as highlighted by the World Health Organization (WHO), which reported 650,000 deaths from HIV-related causes in 2021 alone[1]. In Brazil, the epidemiological profile reflects a concerning scenario with high and persistent rates of various STIs, particularly among vulnerable populations[1].

For example, the *Syphilis Epidemiological Bulletin* of 2024 reports approximately 223,000 new cases of acquired syphilis in 2022, translating to a detection rate of 106.9 cases per 100,000 inhabitants[2]. Similarly, the *HIV Epidemiological Bulletin* highlights the ongoing burden of HIV infection, with 1,011,617 cases reported in Brazil from 1980 to June 2024, and an average of 40,000 new cases annually in recent years[3]. Among these, a notable proportion occurs in young adults, underscoring the urgent need for targeted prevention strategies[3]. Compounding these statistics are findings from recent studies that reveal high prevalence rates of STIs in specific populations[4,5]. For instance, studies among pregnant women report STI prevalence rates ranging from 21 to 24%, with *Chlamydia trachomatis* and syphilis being the most common infections[4,5]. Among female sex workers, HIV prevalence stands at 5.3%, with syphilis reaching 8.5%, while young adults exhibit significant rates of STI coinfections, particularly with HPV and gonorrhea[4,5].

In light of these alarming statistics, Brazil has implemented various measures to address the STI epidemic, including advancements in HIV prevention[6]. One such biomedical intervention is pre-exposure

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prophylaxis (PrEP), a strategy proven highly effective in preventing HIV infection[6]. PrEP involves the daily use of tenofovir and emtricitabine, significantly reducing the risk of HIV acquisition, particularly among men who have sex with men (MSM), sex workers, and other high-risk groups[6]. Despite its efficacy, PrEP remains specific to HIV prevention and should not be conflated with broader STI prevention strategies[6].

However, while PrEP represents a critical tool in the fight against HIV, its usage occurs not without challenges[7]. Studies suggest that the perceived protection offered by PrEP may inadvertently lead to a reduction in condom use among some users, thereby increasing their risk of acquiring other STIs[7]. This phenomenon, known as risk compensation, highlights the importance of comprehensive education and counseling to ensure that PrEP use is accompanied by awareness of its limitations[7]. Further, robust surveillance and prevention programs remain essential to mitigate the rising incidence of STIs in Brazil[7].

OBJECTIVE

This study aimed to describe the percentage of MSM who use PrEP and condoms in their sexual activities.

METHODS

Study characterization

This study is a cross-sectional study with a qualitative and descriptive approach, based on responses about the sexual health profiles of MSM collected through a questionnaire sent via dating apps such as Tinder®, Grindr®, and UMatch®, between September 15, 2021, and March 15, 2022.

Data collection

Data were collected by contacting and administering questionnaires to consenting volunteers through dating apps such as Tinder®, Grindr®, and UMatch®.

A profile named "Men's health research" was created in each of the previously cited dating apps. The profile included the description "Would you be interested in participating in a project that promotes men's health?" (**Figure 1**). The profile targeted men interest in other men and provided clear information about the research focus on the use of PrEP and the sexual health of MSM. It invited users to participate in the research. If a user expressed interest in the study, they could indicate so by giving the profile a "like," which resulted in a "match." This initiated a chat between the research profile and the potential participant.. Researchers then shared links to the informed consent form and the questionnaire, both of which were presented digitally through Google Forms®.

It is important to note that for a match to be made, both the candidate and the research profile must reciprocate with a "like." Researchers reacted with "likes" to all profiles that fit the target audience — MSM residents of Bauru or the surrounding region aged between 18 and 50 years old.

The questionnaire consisted of 10 questions, as shown in Figure 2. All responses came from the research participants. Therefore, no tests were performed to verify whether or not the individual had any STI.

Exclusion and inclusion criteria

All participants who did not complete the questionnaire, did not agree to participate in the research, did not sign the consent form, and did not have sex with men were excluded.

All participants above 18 years old, who completely answered the questionnaire and signed the consent form, were included.

Data analysis

A descriptive analysis with a qualitative approach to data using the tools available in Google Forms® and Excel® was developed. No statistical tests were performed to correlate other possible variables.

Ethics disclaimer

This study was approved by Faculdade de Odontologia de Bauru Human Research Ethics Committee under CAAE number 50015121.5.0000.5417.

RESULTS

A total of 154 participants were included in the study, representing 100% of the sample. Among them, 86.4% (133 individuals) reported being aware of PrEP, indicating they had knowledge of its existence, proper usage, and potential side effects. However, only 11.03%

Figure 1. Profile photo from one of the accounts through which individuals were invited to participate in the research. Written in Portuguese, its translation means: Would you like to participate in a project that seeks to promote men's health?

(17 individuals) had ever used or were currently using PrEP, while 73.37% (113 participants) had not used it but expressed willingness to do so, and 15.60% (24 participants) stated they would not use it.

Among current or former PrEP users, 5.84% (9 individuals) reported having contracted a STI during the time they were using PrEP, with gonorrhea (2.59%, 4 cases) being the most commonly reported infection, followed by syphilis (1.94%, 3 cases) and chlamydia (1.29%, 2 cases). Notably, none of the PrEP users reported contracting herpes or HIV. Regarding condom use, 3.24% (5 participants) of PrEP users reported consistent condom use during all sexual encounters, while 3.89% (6 participants) used condoms in most encounters, 3.24% (5 participants) in a minority of encounters, and 0.64% (1 participant) did not use condoms at all. Among these individuals, the main reasons for not using condoms consistently included feeling protected by PrEP (1.94%, 3 participants), forgetting to use them (1.94%, 3 participants), and other reasons (3.24%, 5 participants).

In contrast, among those who had never used PrEP (88.97%, 137 participants), 18.97% (17 individuals) reported having had an STI. Gonorrhea and syphilis were the most commonly reported infections, each accounting for 3.89% (6 cases), followed by chlamydia (1.29%, 2 cases), herpes (0.64%, 1 case), and HIV (1.29%, 2 cases).

Among participants who had not used PrEP but expressed willingness to do so (73.37%, 113 individuals), 32.46% (50 participants) reported consistent condom use in all sexual relationships, while 31.16% (48 participants) used condoms in most encounters, 7.79% (12 participants) in a minority of encounters, and 1.94% (3 participants) did not use condoms at all. Reasons for inconsistent condom use included a perception of PrEP providing sufficient protection against AIDS (8.44%, 13 participants), difficulty in maintaining

All participants (154–100%)					
Have you already heard about the HIV PrEP?	Yes (133–86.4%)	No (21–13.60%)	-	-	-
Have you ever used or are in use of PrEP?	Yes (17–11.03%)	No, but I would use (113–73.37%)	No, and I don't use it (24–15.60%)	-	-
Current or former PrEP users (17–11.03%)					
Have you had or do you have any sexually transmitted infection (STI) during the period in which you used or are using PrEP?	Yes (9–5.84%)	No (8–5.19%)	-	-	-
If you have ever had an STI, what was it?	Herpes (0–0.00%)	Chlamydia (2–1.29%)	Gonorrhea (4–2.59%)	Syphilis (3–1.94%)	HIV (0–0.00%)
Did you use or do you use condoms during the period in which you used or are using PrEP?	Yes, I use it in all my sexual relationships (5–3.24%)	Yes, I use it in most of my sexual relationships (6–3.89%)	Yes, I use it in the smallest part of my sexual relations (5–3.24%)	No, I do not use condoms in any of my sexual relations (1–0.64%)	-
	I feel protected by PrEP, safe from STIs (3–1.94%)	I think it gets in the way of the relationship (1–0.64%)	At the moment, I end up forgetting to use it (3–1.94%)	Another reason (5–3.24%)	-
Individuals who have never used and are not currently using PrEP (137–88.97%)					
Have you had or do you have any STI during the period in which you used or are using PrEP?	Yes (17–18.97%)	No (120–78.00%)	-	-	-
If you have ever had an STI, what was it?	Herpes (1–0.64%)	Chlamydia (2–1.29%)	Gonorrhea (6–3.89%)	Syphilis (6–3.89%)	HIV (2–1.29%)
Individuals who have not and do not use PrEP, but would use it (113–73.37%)					
Did you use or do you use condoms in your sexual relationships?	Yes, I use it in all my sexual relationships (50–32.46%)	Yes, I use it in most of my sexual relationships (48–31.16%)	Yes, I use it in the smallest part of my sexual relations (12–7.79%)	No, I do not use condoms in any of my sexual relations (3–1.94%)	-
Why don't you use condoms in all your sexual relations?	I feel protected by PrEP, safe from STIs (1–0.64%)	I think it gets in the way of the relationship (8–5.19%)	At the moment, I end up forgetting to use it (15–9.74%)	I think the protection provided by PrEP against AIDS is sufficient (13–8.44%)	Another reason (26–16.88%)
Individuals who have not, do not and will not use PrEP (24–15.60%)					
Did you use or do you use condoms in your sexual relationships?	Yes, I use it in all my sexual relationships (13–8.44%)	Yes, I use it in most of my sexual relationships (9–6.84%)	Yes, I use it in the smallest part of my sexual relations (1–0.64%)	No, I do not use condoms in any of my sexual relations (1–0.64%)	-
Why don't you use condoms in all your sexual relations?	I feel protected by PrEP, safe from STIs (1–0.64%)	I think it gets in the way of the relationship (1–0.64%)	At the moment, I end up forgetting to use it (2–1.28%)	I think the protection provided by PrEP against AIDS is sufficient (1–0.64%)	Another reason (6–3.89%)

HIV: human immunodeficiency virus; STI: sexually transmitted infections; PrEP: pre-exposure prophylaxis.

Figure 2. Questions asked to research participants and their respective responses.

condom use within relationships (5.19%, 8 participants), and other reasons (16.88%, 26 participants).

Finally, among those who had never used PrEP and expressed unwillingness to do so (15.60%, 24 participants), 8.44% (13 individuals) reported consistent condom use during all sexual encounters, 6.84% (9 participants) used condoms in most encounters, 0.64% (1 participant) in a minority of encounters, and 0.64% (1 participant) did not use condoms at all. Reasons for inconsistent condom use in this group included perceived safety from STIs with condoms alone (0.64%, 1 participant), relationship interference (0.64%, 1 participant), forgetting to use condoms (1.28%, 2 participants), and other reasons (3.89%, 6 participants) (**Figure 2 and 3**).

DISCUSSION

PrEP represents a groundbreaking biomedical intervention that has significantly enhanced the prevention of HIV[8]. Its remarkable efficacy in reducing HIV acquisition has solidified its role as a cornerstone in global strategies to eliminate HIV as a public health issue[8]. However, its broader implications for sexual behavior and the incidence of other STIs have sparked ongoing debate[8].

The phenomenon of risk compensation, wherein individuals may alter their behavior due to perceived reductions in risk, has been a focal point in PrEP discussions[8-11]. This derives from a series of studies, including cohorts and literature reviews, that observed a reduction in condom use in MSM using PrEP. For example, some of these studies reported a drop in condom use of between 20 and almost 50%, depending on the local population assessed[10,11]. Consequently, a similar scenario raises concerns about the increase in other STIs[12]. For instance, the Amsterdam PrEP (AMPrEP) project documented consistently high STI rates, while Traeger et al.[8] highlighted significant increases in rectal chlamydia and overall STI diagnoses[8,12].

While these findings are significant, they must be contextualized[12]. The choice to reduce condom use often reflects a complex interplay of factors, including the high efficacy of PrEP against HIV, perceptions of safety, and personal preferences[8-12].

Crucially, the decline in condom use among PrEP users cannot be simplistically attributed to a misunderstanding of PrEP's protective scope[13-16]. Research consistently shows that individuals initiating PrEP are well-informed about its ability to prevent HIV transmission but not other STIs[16]. Instead, reduced condom use often reflects broader evaluations of sexual health and personal well-being[13,16]. Many users place trust in regular STI screening protocols embedded in PrEP programs, which provide opportunities for early detection and treatment of STIs, thereby interrupting transmission chains[13,16]. Furthermore, reduced condom use may stem from a desire to reduce stigma associated with condomless sex, particularly in long-term or seroconcordant relationships[13,16].

The observed rise in STIs among PrEP users should also be considered within the context of broader societal trends that extend beyond PrEP itself[13-16]. For example, shifting sexual norms by changing attitudes toward sexual health and relationships have led to a greater emphasis on sexual autonomy and intimacy[14,16]. Many individuals prioritize physical and emotional connection over perceived risks, especially when they feel protected against HIV[14,16]. Furthermore, in several regions, there has been a noticeable decline in large-scale campaigns promoting consistent condom use[13-16]. This reduction correlates with decreased awareness and normalization of condoms as a default preventive measure[13-16]. Otherwise, the proliferation of dating and hookup apps has transformed sexual networks, increasing opportunities for casual sexual encounters that may prioritize

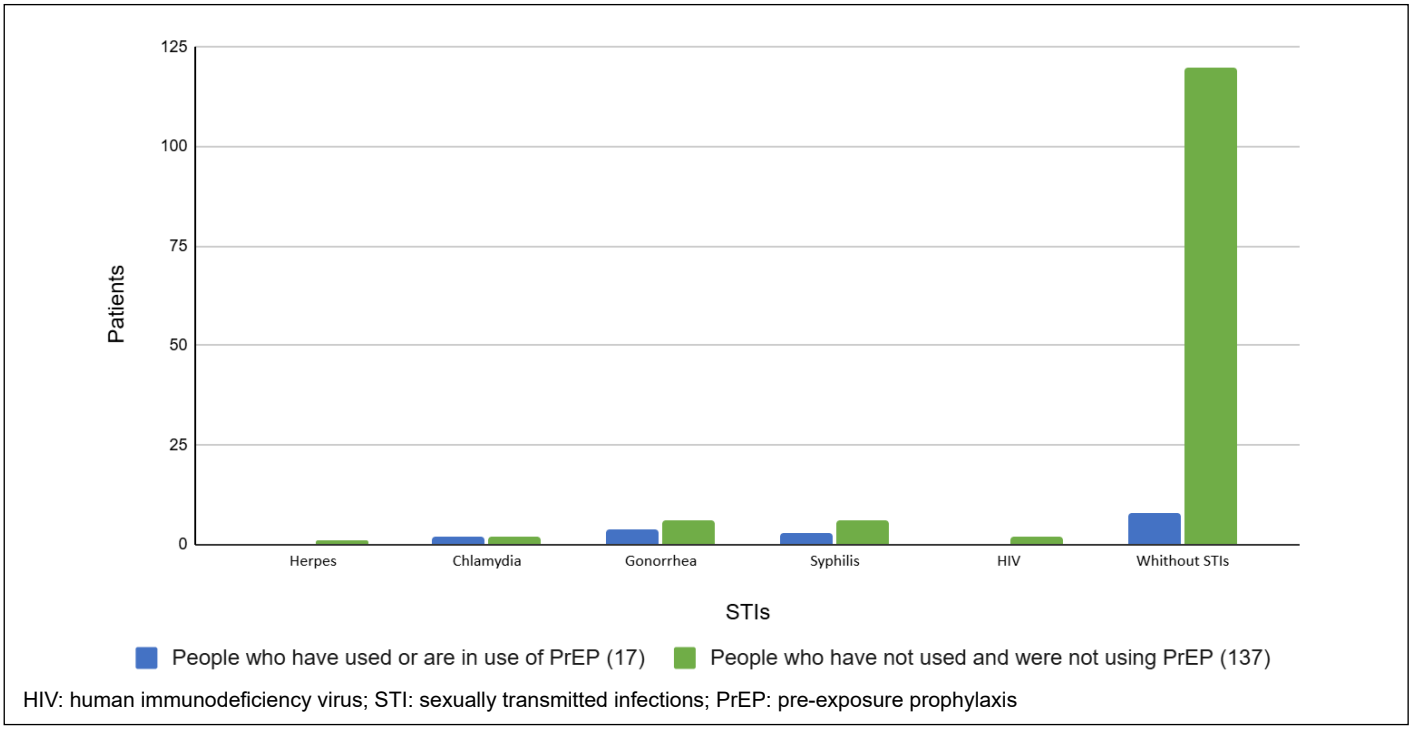

Figure 3. Comparative data on sexually transmitted infections prevalence in the evaluated patients.

spontaneity over traditional risk-reduction methods such as condoms[13-16]. Finally, the increasing prevalence of antibiotic-resistant strains of gonorrhea and other pathogens may also contribute to higher STI incidence[16]. This underscores the need for innovative strategies beyond traditional prevention, such as vaccines and novel treatments[16].

By incorporating these multifaceted considerations, it becomes clear that the relationship between PrEP, condom use, and STI incidence is not a straightforward cause-effect dynamic[13-16]. Far from being a "villain" in STI prevention, PrEP represents an essential component of a combination prevention strategy, which integrates biomedical, behavioral, and structural approaches to tackle HIV and other STIs[8-16]. As public health continues to evolve, the focus should remain on tailoring prevention strategies to diverse populations, recognizing the dynamic interplay between individual behavior and systemic factors, and fostering environments where all individuals can make informed and autonomous choices about their sexual health[8-16].

PrEP's success lies in its capacity to empower individuals at high risk of HIV, providing them with an additional, highly effective tool for prevention[8-16]. This empowerment aligns with the broader concept of combination prevention, which encourages the integration of multiple strategies, such as condom use, harm reduction, STI testing, and behavioral interventions, tailored to individual needs and contexts[10-12]. Combination prevention underscores the autonomy of individuals to make informed choices, a principle fundamental to public health approaches[10-12]. It is essential to emphasize that PrEP is not positioned as a standalone solution but as part of a comprehensive strategy for addressing HIV, STIs, and viral hepatitis[10-12].

The stigma associated with HIV — rooted in its incurable nature and profound societal implications — drives many at-risk individuals to seek PrEP[8,9,16]. This stigma is often perceived as greater than that associated with curable STIs, influencing behavioral choices[8]. By providing a sense of security against HIV, PrEP reduces the psychological burden for users, encouraging open engagement with healthcare systems[8,9]. This contrasts with historical public health messaging, which has often framed condoms as the singular protective measure, inadvertently narrowing the scope of sexual health discussions[8,9].

So, to maximize PrEP's impact, it is imperative to enhance combination prevention strategies in order to strengthen educational campaigns emphasizing the complementary roles of PrEP, condoms, and regular STI testing[10,11]. Furthermore, investments in public health infrastructure aim to expand access to PrEP services and integrate comprehensive sexual health programs to address STIs, HIV, and viral hepatitis simultaneously[10,11]. And, not less importantly, to promote equity in prevention technologies by developing diverse preventive tools tailored to varying vulnerabilities and contexts, ensuring inclusivity in public health efforts[10,11].

Strengths

A significant strength of this study is the innovative use of dating apps as a recruitment tool, enabling access to a population often underrepresented in traditional research methods. These platforms are widely used within the MSM community, providing an efficient and targeted approach to recruitment. This strategy not only facilitated the inclusion of a large and diverse participant pool in a relatively short time frame but also enhanced the representativeness of the sample by reaching individuals across different sociodemographic backgrounds and geographic locations. Additionally, the digital format of the questionnaires offered participants a high level of convenience, privacy, and confidentiality, which is crucial when addressing sensitive topics such as sexual health and behaviors. This likely contributed to a reduction in response bias and encouraged more honest and comprehensive reporting. The study also demonstrated methodological rigor through the implementation of clear inclusion and exclusion criteria, which improved internal validity by ensuring that the sample accurately reflected the target population and reduced confounding influences. Moreover, the study's focus on leveraging digital tools highlights the potential of integrating technology into public health research, setting a precedent for future studies aiming to reach hard-to-access populations. This approach aligns with contemporary shifts in communication and engagement within the MSM community, ensuring that the findings remain relevant and actionable. Collectively, these strengths underscore the study's contributions to advancing research on PrEP use and sexual health in the MSM population.

Limitations

Individuals who respond to recruitment invitations may not represent the broader MSM population, thus restricting the generalizability of the findings. Additionally, the "matching" recruitment method and reliance on questionnaire-based data introduce self-selection bias, as participation may be limited to individuals more engaged or interested in the study topic. The reliance on self-reported data, particularly concerning sensitive behaviors, is vulnerable to response bias, potentially leading to under- or overestimation of behaviors. Moreover, the study's cross-sectional design precludes the establishment of causal relationships between PrEP use and other variables of interest. Notably, STI testing was not conducted; instead, participants were only asked about prior STI diagnoses. This approach does not account for asymptomatic STIs, which are prevalent and often undiagnosed, whereas PrEP users undergo regular STI testing as part of their follow-up protocol, potentially introducing disparities in self-reported data. Furthermore, methodological considerations remain regarding whether the observed reduction in condom use can be directly attributed to PrEP or if other confounding factors are at play. Finally, the study is limited by the small and unequal group sizes, with only 17 participants in the PrEP user group compared to 137 in the non-user group, which may affect the robustness and reliability of comparisons.

CONCLUSION

Based on the results, it can be concluded that while PrEP is effective in preventing AIDS, a lack of awareness about its scope and limitations leads to risky sexual behaviors. Some users and potential users of PrEP refrain from using condoms in all sexual encounters due to a false sense of security, which can increase exposure to non-AIDS STIs. This highlights the need for greater awareness of

proper PrEP use, disseminated through media, healthcare centers, and other strategic points. Additionally, linking PrEP awareness with its distribution is crucial to prevent health risks. Given the limited studies on PrEP and associated risks, this research contributes to expanding knowledge on the topic.

Approval by the Human Research Ethics Committee

This study was approved by Faculdade de Odontologia de Bauru Human Research Ethics Committee under CAAE number 50015121.5.0000.5417.

Participation of each author

WO: Conceptualization, Data curation, Formal analysis, Validation. EGR: Conceptualization, Data curation, Formal analysis, Validation. APMS: Conceptualization, Data curation, Formal analysis, Validation. LCPL: Data curation, Formal analysis, Methodology, Software, Validation. MNN: Methodology, Project administration, Supervision, Validation. ELD: Methodology, Project administration, Supervision, Validation.

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Conflict of interests

The authors declare no conflicts of interest.

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