Analysis of sexually transmitted infections in PrEP users: population assessment in Curitiba, Brazil

Análise das infecções sexualmente transmissíveis em usuários de PrEP: avaliação de população em Curitiba

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ABSTRACT

Introduction: The pre-exposure prophylaxis (PrEP) is a globally recognized pharmacological approach, consisting of a daily dose of antiretroviral drugs used to reduce the contamination rate by the human immunodeficiency virus (HIV). This combined prevention program was first offered by the Brazilian public health system in 2017 and was provided by Testing and Counseling Centers. **Objective:** To analyze the profile of pre-exposure prophylaxis users seen at Testing and Counseling Centers in Curitiba (state of Paraná, Brazil) and the presence of HIV and other sexually transmitted infections, such as syphilis, hepatitis B and C, in these users. **Methods:** This is an analytical, cross-sectional study, using database provided by the information system of the Testing and Counseling Center. **Results:** Users of HIV pre-exposure prophylaxis are mostly young, white, single men, and who are part of the group of men who have sex with other men. It was verified that, even though the HIV pre-exposure prophylaxis plays a major role in HIV prevention, it is paramount to encourage combined prevention, considering there is a significant relationship between the lack of barrier methods and positive results for syphilis. **Conclusion:** No connection between the use of HIV pre-exposure prophylaxis and increased incidence of sexually transmitted infections was established in the present study.
Keywords: Sexually transmitted infections. Pre-exposure prophylaxis. HIV.

RESUMO

Introdução: A profilaxia pré-exposição é uma abordagem farmacológica global, que consiste no uso diário de antirretrovirais, utilizada para reduzir a contaminação pelo vírus da imunodeficiência humana. É uma estratégia de prevenção combinada que começou a ser ofertada no Brasil pelo Sistema Único de Saúde em 2017, por meio dos Centros de Testagem e Aconselhamento. **Objetivo:** Analisar o perfil dos usuários da profilaxia pré-exposição atendidos pelo Centro de Orientação e Aconselhamento de Curitiba, bem como analisar a presença do vírus da imunodeficiência humana e outras infecções sexualmente transmissíveis (sífilis, hepatite B e hepatite C) nesses usuários. **Métodos:** É um estudo analítico transversal, utilizando dados do Sistema de Informação do Centro de Testagem e Aconselhamento fornecidos pelo Centro de Orientação e Aconselhamento. **Resultados:** Foi observado que os usuários da profilaxia no estudo são majoritariamente jovens do sexo masculino, brancos e solteiros, que se enquadram no grupo homens que fazem sexo com homens. Verificou-se também que ainda que a profilaxia pré-exposição desempenhe um papel importante na prevenção do HIV, é fundamental o incentivo à prevenção combinada, pois há uma relação do não uso de métodos de barreira com os resultados positivos para sífilis nesses pacientes. **Conclusão:** Não foi possível, neste estudo, estabelecer uma relação do uso de profilaxia pré-exposição com o aumento da incidência de infecções sexualmente transmissíveis.
Palavras-chave: Doenças sexualmente transmissíveis. Profilaxia pré-exposição. HIV.

INTRODUCTION

Currently, 37.6 million people live with the human immunodeficiency virus (HIV) worldwide and about 920 thousand people in Brazil[1,2]. Since the first case confirmed in the country, in the early 1980s, efforts to cope with the disease are evident[3]. Later, in 1991, the treatment began to be provided by the Brazilian Ministry of Health, enabling the control of virus replication and the consequent improvement of the immune system of carriers, culminating in increased life expectancy and making the profile of the disease chronic[4]. In this context, Brazil has become a world reference for the treatment of people with HIV, as in the country the treatment is completely free, exclusively provided by the Brazilian Unified Health System (SUS)[5]. Since its peak in 1998, HIV infections have decreased by 47%, and today it is estimated that the prevalence of infection is 0.4%[2,6].

Nowadays, pre-exposure prophylaxis (PrEP) is the best method to prevent the virus. It began to be used worldwide in 2014, when the first research indicated its effectiveness; in Brazil, it began to be used in 2017 with the expectation of avoiding new infections, thus controlling the epidemic. It consists of a global prevention approach that includes the daily use of antiretroviral drugs (Tenofovir and Emtricitabine) by individuals not infected with HIV, but at substantial risk of infection[7-9].

There are groups eligible for PrEP, namely individuals considered to be at higher risk, such as men who have sex with men [MSM] (10.5%), female sex workers (4.9%), drug users (5.9%), transgender persons (31.2%), and other risk groups such as people deprived of liberty and in serodifferent relationships[9-14]. The daily and regular use of antiretroviral drugs is essential to ensure the high level of protection and efficacy of PrEP, reducing the risk of contagion in more than 90% of patients. The impacts of the medication on the reduction of cases can already be perceived: in São Paulo (state of São Paulo, Brazil), in 2018, there was the largest decrease (11.7%) in HIV infection in history compared with data from the previous year. This may be associated with the adoption of PrEP associated with combined prevention strategies[15].

Therefore, this study aims to analyze the epidemiological profile and the results achieved by monitoring PrEP users.

OBJECTIVE

To delineate the profile of PrEP users assisted by the Testing and Counseling Center (*Centro de Orientação e Aconselhamento* – COA) of the city of Curitiba, state of Paraná, Brazil, and to analyze the results achieved by following up this population, with the monitoring of syphilis, hepatitis B and hepatitis C, and HIV.

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METHODS

This is a cross-sectional, analytical study conducted by data collection carried out in the Information System of the Testing and Counseling Center (*Sistema de Informação do Centro de Testagem e Aconselhamento* – SiCTA), between January 2019 and January 2020, collected by the COA in document format. This system provides the history of healthcare services provided for patients who use PrEP, such as epidemiological information and quarterly serological tests, without the need to identify or approach the individuals.

The following data were verified: city; age; marital status; race; education level; occupation; reason for seeking the healthcare service; population selection; the number of male, female, and transgender partners; fixed partners; casual partners; use of barrier contraceptives; use of chemicals; and serology tests. In addition, the authors chose to investigate sexually transmitted infections (STIs) recommended in the guideline for the use of PrEP, namely: syphilis, hepatitis B and hepatitis C, in addition to serology tests for HIV.

The study location was the city of Curitiba, capital of the state of Paraná, in southern Brazil. The city had an estimated population of 1,948,626 inhabitants in 2020, according to data from the Brazilian Institute of Geography and Statistics (IBGE).

The sample consisted of men and women older than 18 years of age, with negative serology tests for HIV, and using PrEP for at least one year, seen by the COA between the months of January 2019 and January 2020. Individuals with the following characteristics were excluded: people under 18 years of age, non-PrEP users, not seen by the COA service, and whose medical records were not electronic.

Data were provided in Excel table format and under the supervision of COA coordination. The anonymization of data was performed, replacing the names with codes.

Qualitative variables were defined to analyze epidemiological characteristics and to delineate the profile of the sample. Regarding the analysis of the obtained data, the Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to evaluate the normality of quantitative data by using the GraphPad Prism 3.0 software. These variables were expressed as mean±standard deviation when in normality, or as median [min-max] when not complying with normality. The Chi-square test and Fisher's exact test were used to compare the qualitative data. The continuous variables were compared with nonparametric Mann-Whitney and Kruskal-Wallis tests. Lastly, the outcome variables were compared with epidemiological and profile variables. Values of $p<0.05$ were considered statistically significant.

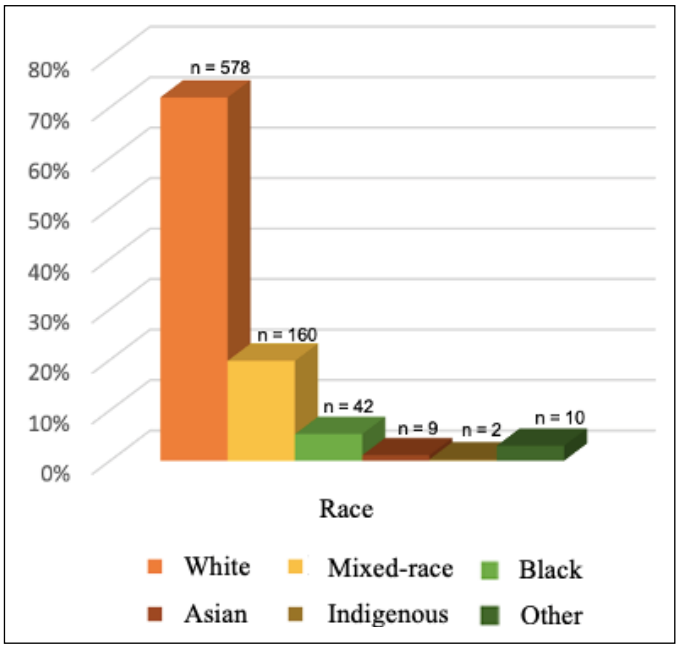
The study was approved by the Research Ethics Committee of Universidade Positivo (Centro de Estudos Superiores Positivo Ltda.), under opinion No. 4.033.627, as well as by the Research Ethics Committee of the Municipal Health Department of Curitiba.

RESULTS

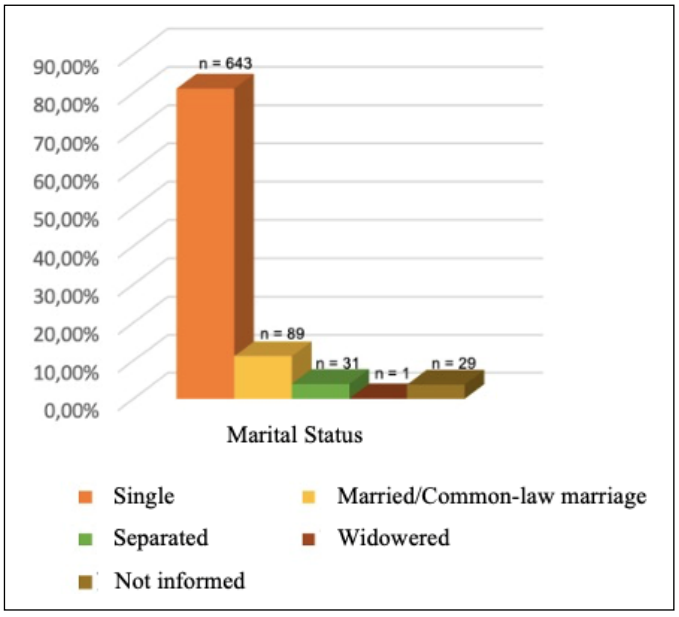
From over 20,000 registered appointments, after treatment and application of inclusion and exclusion criteria, unification of appointments, and exclusion of incomplete records, a sample of 797 patients was selected. Ultimately, four of them were excluded due to positive test for HIV in the period defined for collection, resulting in a final sample of 793 patients.

Among the evaluated adults, 90.7% were men with a mean age of 31 years, ranging from 18 to 64 years. Most (72%) were white (**Figure 1**), 81.1% were single (**Figure 2**), and 64.1% had 12 years or over of formal education (**Figure 3**).

Of the total number of users, 93.9% were MSM, 4.7% were sex workers, and 1.5% were transgender persons. From this universe, 162 (20.4%) reported being in serodiscordant relationships (**Figure 4**). As for the number of sexual partners (in 12 months), the average per person was 40, with a standard deviation of 174, a minimum of one per person, and a maximum of



Source: Prepared by the authors.
Figure 1 – Race of pre-exposure prophylaxis users.

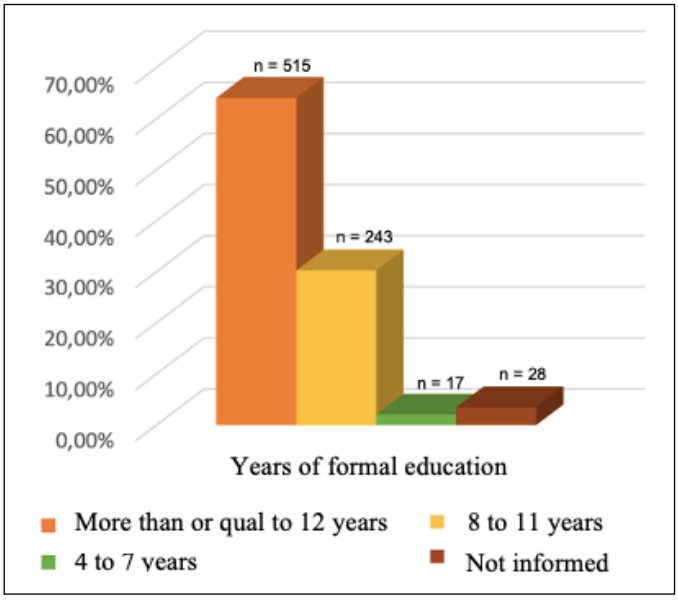


Source: Prepared by the authors.
Figure 2 – Marital status of pre-exposure prophylaxis users.

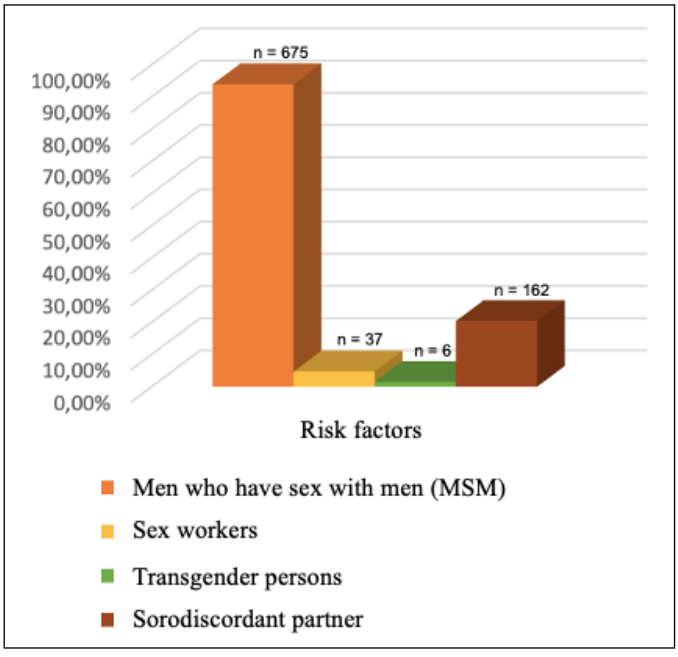
3.010. Prevention consisted of the main reason for seeking the healthcare service (55.2%).

Regarding substance use, 73.3% denied it, while 27.7% reported using some type (marijuana, cocaine, amphetamine, heroin and others). Specifically, regarding alcoholic beverages, 35.7% reported sporadically consuming them; 4.3% reported their frequent consumption; and 54.4% did not inform it.

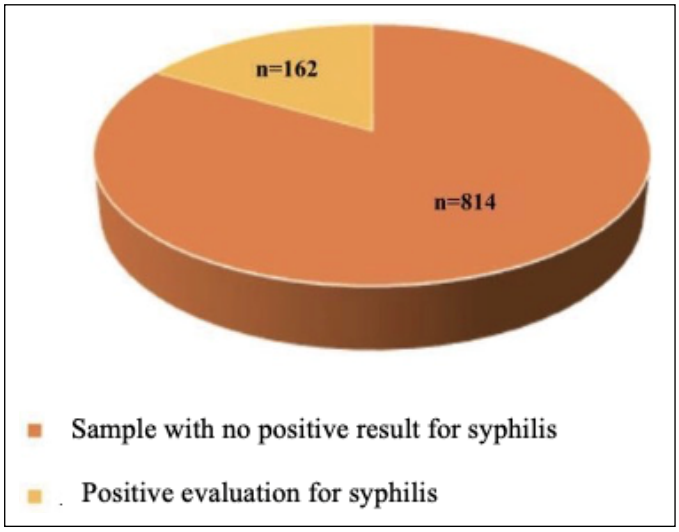
In the follow-up appointments after testing for STIs, there was a positive evaluation for syphilis in 16.6% of the sample, with a total of 162 positive tests (**Figure 5**). Participants who tested positive had an average of 43.9 sexual partners (in 12 months), with a standard deviation of 102, with p=0.0047.



Source: Prepared by the authors.
Figure 3 – Years of formal education of pre-exposure prophylaxis users.



Source: Prepared by the authors.
Figure 4 – Predominance of risk factors of pre-exposure prophylaxis users.



Source: Prepared by the authors.
Figure 5 – Total of positive results for syphilis.

DISCUSSION

This study demonstrated the scenario after the implementation of PrEP for the studied population. PrEP was implemented as a public policy to complement others, such as sex education, encouraging the use of condoms and testing and treatment against STIs. This method is only employed in HIV prevention in key populations and groups vulnerable to STIs. It is discussed whether, due to the use of PrEP, users could reduce the use of condoms, thus being more susceptible to other STIs[16].

During the clinical follow-up of PrEP users, adhesion is verified; possible HIV infection is ruled out; adverse events and STIs are monitored through quarterly tests for syphilis, hepatitis C, hepatitis B, and semiannual tests for chlamydia and gonococcus. Compared with the general population, testing and subsequent diagnosis are more frequent in the population using PrEP[17,18].

PrEP, when regularly taken, offers a level of protection greater than 90% against HIV infection[18]. The efficacy of this prophylactic method can be observed by comparing the number of HIV cases reported in Brazil by the Notifiable Diseases Information System (*Sistema de Informação de Agravos de Notificação* – SINAN). While in 2017 a total of 44,943 cases were reported, in 2019, the figure decreased to 41,919[17]. The great challenge seems to be reaching the people who will benefit the most from this prevention method[19].

In Brazil, from 2018 to 2021, 39,323 people started using pre-exposure prophylaxis; 16,388 of them discontinued its use, thus totaling 22,935 people using prophylaxis. Of these, 78% reported, on the first follow-up visit 30 days later, that they took all the tablets properly, and 29% reported some adverse event. About 42% of the users who started the use of PrEP discontinued it at some point, and not attending the follow-up visit was the main reason do to so[20]. The number of abandonment of PrEP is significant, and this fact may

be related to the presence of social barriers, limited knowledge of health professionals, and concentration of dispensing services in large cities and capitals[19].

In the present study, the prevalence of 93% of MSM was verified, compatible with the national percentage of users (78%)[21]. About 5% of the users in this study were sex workers and 0.7% were transgender persons, whereas in Brazil, 10% are female sex workers and 0.2%, transgender persons. Regarding education level, a high average of years of formal education was found: 64.1% of the patients in the analysis had more than 12 years of formal education, while the national percentage with the same education level was 76.9%[2,22].

Therefore, the authors wonder whether the population with less education and more marginalized would be in a lower percentage due to lack of knowledge of the need for follow-up, prevention, and difficulty of access[19].

As for the incidence of STIs during follow-up, syphilis predominated (16.6%), with 162 positive tests, followed by hepatitis C (0.3%) and hepatitis B (0.1%). It was analyzed that the higher number of sexual partners is related to the higher incidence of syphilis. Participants who tested positive had an average of 43.9 sexual partners in 12 months (SD=102; p=0.0047), a higher rate when compared with the total average of 40 (SD=174).

The association of PrEP prescription with STIs cases in the following year compared with the previous year has been reported with a 72% increase in chlamydia, gonococcus, syphilis, and hepatitis C infections in a study conducted by Nguyen, Vinh-Kim et al. (2018) in the city of Montreal (Canada), from 2010 to 2015[17,23]. Conversely, there is also lack of evidence of risk compensation and no increase in STIs rates among users in the IPrEX study[24]. In addition, in a study on the implementation of PrEP conducted in San Francisco, Washington DC, and Miami (United States of America), Liu et al. showed that the rate of risky sexual behavior and STIs remained stable with the structure of the strategy[25].

Considering the different results found in the literature, it is evident that although PrEP has influenced the sexual behavior of patients, its repercussion on the incidence of STIs is still uncertain[26].

Strengths

The main perceived strength was the richness of data provided in electronic medical records, allowing a reliable analysis of the profile of patients.

Limitations

As limitations, a limited period of follow-up of patients is pointed out, in addition to incomplete forms, thus reducing the number of patients eligible for the study.

CONCLUSION

PrEP users are mainly young, men, white, single, with more years of formal education, and who are part of the MSM group. Conversely, transgender persons and sex workers are in lower percentages, demonstrating that the most vulnerable populations still face barriers to have access not only to medication, but also to testing and follow-up. A significant association was also observed in the number of sexual partners with positive syphilis tests.

Therefore, to obtain effective control of HIV and other STIs, it is necessary to focus on the most susceptible populations, through the combined prevention associated with periodic testing.

In order to stimulate the adhesion to PrEP, the authors suggest the promotion of training programs for healthcare professionals, public health strategies, and access to healthcare and dispensing centers in addition to conducting more research.

Approval by Research Ethics Committee

The study was approved by the Research Ethics Committee of Universidade Positivo (Centro de Estudos Superiores Positivo Ltda.), under opinion No. 4.033.627.

Participation of each author

MJMCR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. MRV: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. JSA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. MGM: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. JVBL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. DCP: Conceptualization, Formal analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – review & editing.

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Conflict of interests

The authors declare no conflicts of interest.

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