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# Awareness and acceptance of Pre-exposure Prophylaxis (PrEP) for HIV among undergraduate students in a private medical university in Malaysia

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**Background:**

Pre-exposure prophylaxis (PrEP) is an evidence-based strategy recommended for at-risk-populations for prevention of HIV transmission. However, the level of PrEP awareness and acceptance among Malaysian undergraduate students is currently unknown.

**Objectives:**

To assess the sexual activities, sexual behaviors, risk perception, awareness, and acceptance of PrEP of medical compared to non-medical students in a private medical university.

**Method:**

Demographic data, sexuality, sexual activity and behaviors, source of HIV knowledge, self- perceived risk of HIV, awareness and acceptance of PrEP were collected using an online anonymous survey among medical and non-medical students at a private medical university. Descriptive, comparative and regression analyses were performed where applicable. A *p*-value < 0.05 was considered statistically significant.

**Results:**

A total of 369 (187 medical, 182 non-medical) students responded. The median age was 22 with female:male ratio of 2:1. Eighty-one (22%) were sexually active of which 54% used condoms inconsistently, 58% had condomless sex in the preceding six months and 35% had casual or transactional sex. Despite this, 33 perceived themselves to be at low risk of HIV. Most learned about HIV from their coursework. PrEP awareness was 40% versus 20% while PrEP acceptance was 69% versus 67%, between medical and non-medical students, respectively.

**Conclusion:**

Awareness of PrEP among medical students was low and even lower among non-medical students. PrEP acceptance was fair after viewing an introductory video on PrEP. PrEP must be included in the course curriculum. Studies to identify reasons for PrEP-hesitancy should be conducted to help guide policies and initiatives toward promoting PrEP as an additional tool in HIV prevention.

***Keywords:*** *Preexposure prophylaxis, Malaysia, HIV, acceptance, awareness*

## Introduction

Pre-exposure prophylaxis (PrEP) against Human Immunodeficiency Virus (HIV) is the use of anti-HIV medication to keep HIV-negative people from being infected. PrEP is approved as an addition to the armament of effective tools for the prevention of HIV transmission by the U.S. Food and Drug Administration (FDA). PrEP has been shown to be safe and highly effective when taken as prescribed.[1]

Annually, there are up to two million new HIV infections worldwide. In the absence of an effective vaccine to prevent HIV transmission, behavioral and biomedical HIV prevention strategies to reduce HIV acquisition are the main strategies against HIV transmission. PrEP has been shown to reduce the risk of sexual transmission of HIV by between 75% to 99% in various at-risk populations.[2-6]

Many countries in the West have approved PrEP for HIV prevention while other countries, particularly in the Asia Pacific region, have embarked on several PrEP implementation projects.[7] In Malaysia, PrEP is

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part of the Ministry of Health's "National Strategic Plan to end AIDS by 2030". Until recently, the access and availability of PrEP is restricted to a small number of private clinics or hospitals in major cities. Awareness of PrEP in at-risk communities and the general public is low.

The age of sexual debut among university undergraduates in Malaysia aged between 17 to 30 years was 18.2 years with a prevalence of sexual intercourse of 20%. More than half of them reported engaging in sexual activities and behaviors that placed them at significant risk of acquiring sexually transmitted infections (STI) including HIV.[8] Another Malaysian study among adolescents aged between 15 – 21 years reported a prevalence of sexual intercourse of 9% with low level of contraceptive prevalence.[9] Clearly some adolescents and young adults in Malaysia are at greater risk of exposure to HIV and other STIs.

There are very few studies on awareness and acceptance of PrEP among university students in the Asia Pacific region. A Thai study among 641 university students in a public university reported that 67% were willing to accept PrEP.[10] The level of PrEP awareness and acceptance among Malaysian undergraduate students is currently unknown. This study was conducted among medical and non-medical undergraduate students from a private medical university in Malaysia to explore their sexual activities, sexual behaviors, risk perception, and the awareness and acceptance of PrEP of medical students compared to non-medical students.

## Methods

### *Study site and sample size calculation*

An online survey was conducted among medical and non-medical undergraduate students at the International Medical University (IMU), a private medical university in Malaysia. The study period was between November 2017 and June 2018. The total number of undergraduate students in the university at the time of the survey was 3111. The sample size required for statistical significance was calculated to be 342 with a 95% confidence interval, assuming a 20% non-participation rate.

### *Survey tool and recruitment of students*

The online questionnaire had five sections. The first section contained questions to collect demographic data such as gender, age, and course of study. The second section explored the relationship status, sexuality, sexual activities, and behaviors of the students in the preceding six months. The third section explored the sources from where the students had acquired their knowledge of HIV, prior HIV testing, self-perceived risk of HIV acquisition, and awareness of PrEP. In the fourth section, the participants were asked to watch a short introductory online video on PrEP.[11] In the last section, the participants were asked about their willingness to accept PrEP as an HIV-prevention tool. The average time to complete the questionnaire online was between 10 to 15 minutes. Recruitment of participants was done via invitation emails to the students' university email accounts and publicity via closed student groups on social media. Participation was voluntary and pre-participation consent was obtained online.

### *Ethical approval*

This research project was approved by the Joint Research and Ethics Committee of the IMU (CSc/Sem6(04)2018).

### *Statistical analysis*

Descriptive analysis methods were used to describe the demographic characteristics, including sexual activities and behaviors. Comparison between medical and non-medical students was made using chi-square analysis. A *p* value of <0.05 with a 95% confidence interval was considered statistically significant. All statistical analyses were conducted using the SPSS Version 20.0 (SPSS Inc., Chicago, IL)

## Results

### *Participants' characteristics and risk factors for HIV transmission of respondents.*

Out of 3111 students, 369 students (187 medical versus 182 non-medical) participated. The median age was 22 (range 18 – 36) years. The female to male ratio was 2:1. Most were not in a relationship (229, 62.1%), one-third were in monogamous relationship (130, 35.2%) and 10 (2.7%) students were in non-monogamous relationship. Most identified as heterosexuals (302, 81.8%) while 27 (7.3%) and 19 (5.1%) identified as homosexuals and bisexuals, respectively. Eighty-one (22.2%) students were sexually active. (Table I)

**Table I: Demographic characteristics of study respondents (n = 369)**

| | FREQUENCY | PERCENTAGE |
|---|---|---|
| **GENDER** | | |
| Female | 241 | 65.3 |
| Male | 128 | 34.7 |
| **COURSE OF STUDY** | | |
| Medical | 187 | 50.7 |
| Non-medical | 182 | 49.3 |
| **RELATIONSHIP STATUS** | | |
| Not in a relationship | 229 | 62.1 |
| In a monogamous relationship | 130 | 35.2 |
| In a non-monogamous relationship | 10 | 2.7 |
| **SEXUALITY** | | |
| Heterosexual | 302 | 81.8 |
| Homosexual | 27 | 7.3 |
| Bisexual | 19 | 5.2 |
| Prefer not to say | 21 | 5.7 |
| **SEXUALLY ACTIVE** | | |
| Yes | 81 | 22.2 |
| No | 288 | 77.8 |

***Sexual activities and behaviors, HIV testing and self-perceived risk of HIV acquisition.***

Fifty-eight (15.8%) of 81 sexually active students had at least one sexual intercourse in the preceding month. Thirty-seven (10%) students reported condoms use all the time during sexual intercourse while 44 (12.0%) used condoms some of the time or not at all. Thirty-five students (9.5%) had condomless sex in the preceding month. Seventy-six students (20.5%) had between 1 – 10 sex partners while 5 (1.5%) students had more than 10 sex partners in the preceding month. (Table II)

Seventy students had regular sex partners while 21 students had casual sex partners. Four and three students either paid or were paid for sex, respectively. Seventy-one students had engaged in oral sex, 59 in vaginal sex and 22 in anal sex. One-hundred-thirty-nine (37.7%) students had tested for HIV in the preceding 6 months. Thirty-three (14.4%) students perceived themselves to be at low risk of HIV acquisition while 20 (37.8%) students perceived themselves to be at moderate to high risk of HIV acquisition. (Table II)

**Table II: Sexual behavior, sexual activities, HIV testing and perceived risk of HIV acquisition**

| | FREQUENCY | PERCENTAGE |
|---|---|---|
| **Last sexual activity (n = 81)** | | |
| < 1 month | 58 | 71.6 |
| 1 – 2 months | 13 | 16.0 |
| 3 – 4 months | 6 | 7.4 |
| 5 – 6 months | 2 | 2.5 |
| > 6 months | 2 | 2.5 |
| **Used condoms during sex in the preceding month (n = 81)** | | |
| All the time | 37 | 45.7 |
| Some of the time | 25 | 30.9 |
| Not at all | 19 | 23.4 |
| **Last condomless sex (n = 81)** | | |
| < 1 month | 35 | 43.2 |
| 1 – 2 months | 9 | 11.1 |
| 3 – 4 months | 2 | 2.5 |
| 5 – 6 months | 1 | 1.2 |
| > 6 months | 4 | 5.0 |
| Prefer not to say | 30 | 37.0 |
| **Types of sexual partners (n = 81)** | | |
| Regular partner | 70 | 86.4 |
| Casual partners | 21 | 25.9 |
| Paid for sex | 4 | 4.9 |
| Was paid for sex | 3 | 3.7 |

**Table II: Sexual behavior, sexual activities, HIV testing and perceived risk of HIV acquisition**

| | | |
|---|---|---|
| **Types of sexual activities (n = 81)** | | |
| Vaginal | 59 | 72.8 |
| Anal | 22 | 27.2 |
| Oral | 71 | 87.7 |
| **HIV testing in the preceding 6 months (n = 369)** | | |
| Yes | 139 | 37.7 |
| No | 230 | 62.3 |
| **Perceived risk of HIV acquisition via sex (n = 53)** | | |
| Low | 33 | 62.2 |
| Moderate | 17 | 32.1 |
| High | 3 | 5.7 |

***Source of HIV knowledge.***

The majority of the students reported their course of study provided them with knowledge about HIV. Plenaries and self-reading were the major sources of HIV knowledge for these students. (Table III)

**Table III: Source of knowledge of HIV (n = 369)**

| | Medical (%) n = 187 | Non-medical (%) n = 182 |
|---|---|---|
| **Does your course of study provide you the knowledge about HIV?** | | |
| Yes | 183 (97.8) | 141 (77.5) |
| **Source of HIV knowledge** | | |
| Plenaries | 153 (81.8) | 63 (34.6) |
| PBL/TBL | 111 (59.4) | 54 (29.7) |
| Elective posting | 44 (23.9) | 11 (6.0) |
| Self-reading | 161 (86.1) | 106 (58.2) |
| Hospital/Clinic visit | 109 (58.3) | 40 (22.0) |

** Med: medical ; Non-med: non-medical.*

***Awareness and acceptance of PrEP***

More medical students (75, 40.1%) were aware of PrEP compared to non-medical students (36, 19.8%), ($p < 0.001$). After viewing a short video on PrEP, 69% of medical versus 67.8% of non-medical students were willing to accept PrEP as an HIV-prevention tool ($p = 0.772$). Eighty-six percent of medical versus 87.8% of non-medical students who were willing to accept PrEP would also use a condom during sexual intercourse ($p=0.676$). (Table IV)

**Table IV: Awareness and acceptance of PrEP**

| | Medical (%) n = 187 | Non-medical (%) n = 182 | p-value* |
|---|---|---|---|
| **Awareness of PrEP** | | | |
| Yes | 75 (40.1) | 36 (19.8) | < 0.001 |
| **Willingness to take PrEP after viewing PrEP video** | | | |
| Yes | 129 (69.0) | 123 (67.6) | 0.772 |
| No | 58 (31.0) | 59 (32.4) | |
| **Will you use a condom while on PrEP?** | | | |
| Yes | 111 (86.0%) | 108 (87.8%) | 0.676 |

** Chi-square test for medical versus non-medical students, $p < 0.05$ considered significant.*

**Discussion**

The prevalence of sexual activity among teenagers in Malaysia was reported to be 5.4% among school-going teenagers aged 12 – 19 years, and 12.6% among urban teenagers aged 15 – 20 years, respectively.[12] The prevalence of sexual activity among the student population aged 18 – 36 in this study was 22.2% (81/369). Eighty-six percent of them had sexual intercourse in the preceding 1-2 months. A quarter of them had casual sex partners while a small number had engaged in transactional sexual intercourse. Only 45% reported consistent condom use while 58% had at least one condomless sexual intercourse in the preceding six months. Sexual activities included oral, vaginal, and anal sex. About 38% (20/53) of sexually active students perceived their risk of HIV acquisition to be moderate to high. Overall, 37.7% (139/369) had tested themselves for HIV at least once in the preceding six months.

The prevalence of sexual activity among the students in this study may be considered high with a significant risk of HIV acquisition through unsafe sexual practices including inconsistent condom use, multiple sexual partners, and a relatively low rate of HIV testing.

Almost 88% of all students acknowledged their course curriculum covered HIV as a topic. Medical students appeared to have more exposure to education about HIV through the various teaching-learning modalities compared to their non-medical counterparts ($p< 0.001$) who, by nature of their course, may have less clinical exposure and hence less exposure to patients

with HIV infections. Nevertheless, the awareness of PrEP was low for both groups of students: 40.1% among medical students versus 19.8% among non-medical students ($p < 0.001$). This may be because PrEP was not covered as a topic in their curriculum.

However, after viewing a short video regarding PrEP during the survey, almost 70% (129/187) of medical students and 68% (123/182) of non-medical students indicated they were willing to accept PrEP. This suggests that once awareness of PrEP is attained, acceptance of PrEP was fairly good. At the same time, 86% (111/129) of medical students and 88% (108/123) of non-medical students indicated they will continue to use the condom during sexual intercourse while on PrEP, suggesting they had a "more-is-safer" approach to keeping themselves safe from HIV. These students may not be aware of the high efficacy of PrEP as an HIV prevention tool. PrEP has been shown to reduce HIV transmission from sexual intercourse by 99% when taken daily in men who have sex with men (MSM) and by 75% in heterosexual partners.[2-4,6]

Prior to 2023, access to PrEP was restricted to very few private health clinics or hospitals, and community-based centers managed by non-government organizations that were concentrated in major cities in Malaysia. In January 2023, the Ministry of Health, Malaysia launched a pilot project to provide complimentary PrEP in the form of oral tenofovir-emtricitabine in adults at high risk of sexually acquired HIV infection in 18 health clinics throughout the country.[13] This nationwide initiative has enabled easier access to PrEP for people at risk of acquiring HIV sexually. However, easier access means nothing if awareness of the benefits of PrEP is lacking. If the result of our study is any indication, awareness of PrEP is evidently lacking among tertiary students including medical students. Efforts to raise awareness of the benefits and availability of PrEP need to be stepped up especially among the at-risk communities and sexually active youths and adults. PrEP should be included as a topic in HIV education in all formal and non-formal sex education programmes or activities at all levels of engagement in the community and at every educational level.

### *Study limitations*

The survey was conducted online anonymously. There were too few students who identified as non-heterosexuals, and those who had multiple sexual partners to allow for meaningful statistical analyses. The study was conducted in a private medical university which would naturally have HIV-related topics in the curriculum of various medical and non-medical programmes. This may not be the case in non-medical tertiary centers of higher learning in the country. The latter are likely to have significantly fewer HIV-related topics in their curricula and even lower awareness of PrEP. Acceptance of PrEP before the viewing of an educational video on PrEP was not assessed, as with the reasons for PrEP-hesitancy.

## Conclusions

Awareness of PrEP among medical students was low and even lower among non-medical students. After viewing a short video on PrEP, acceptance of PrEP by both groups of students was fair. Efforts to raise awareness of PrEP including education about PrEP must be included in the course curriculum and may even be at pre-university levels. Studies to identify reasons for PrEP-hesitancy should be conducted which can then help guide policies and initiatives toward promoting PrEP as an additional tool in HIV prevention.

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