RESEARCH ARTICLE

Knowledge and Behavior in Human Immunodeficiency Viruses and Reproductive Health of Human Immunodeficiency Viruses-infected Serodiscordant Couples in the Capital City of Indonesia

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Abstract

Aims and background: Human immunodeficiency viruses (HIV) have emerged as a widespread crisis, posing a substantial obstacle to both development and public health. Serodiscordant couples of reproductive age encounter an even greater challenge, requiring comprehensive, and accurate information on cohabitation dynamics and measures to safeguard HIV-negative partners from infection. Simultaneously, they maintain equal reproductive rights. The objective of this study is to describe the understanding and behaviors related to HIV and reproductive health among serodiscordant couples receiving care at the HIV-integrated center of Dr Cipto Mangunkusumo National General Hospital in Jakarta, Indonesia.

Materials and methods: This study is a cross-sectional descriptive observational study. The study was conducted on 108 respondents. The evaluation of knowledge and behavior levels involved the administration of a validated questionnaire to eligible research participants meeting specific inclusion and exclusion criteria.

Results: Among the 108 participants, 59% demonstrated a high degree of HIV knowledge, while 76% exhibited a moderate level of knowledge regarding reproductive health. In terms of behavior, 39.8% consistently used condoms, 41.7% engaged in multiple sexual partnerships, and 10.2% reported engaging in anal intercourse. Notably, 96% adhered to a regular regimen of antiretroviral medications, and none utilized assisted reproductive technology. Additionally, 54.6% of respondents maintained an ongoing reproductive plan, while 39.8% of those with living children had not verified their child's HIV status.

Conclusion: The majority of participants demonstrate a solid understanding of HIV, but there is room for enhancement in reproductive health knowledge. There is a need for improved accessibility to information and education on reproductive health, particularly in the context of assisted reproductive technology for HIV serodiscordant couples, in Indonesia.

Keywords: Assisted reproductive technology, Educational status, Human immunodeficiency virus infections, Reproductive health, Reproductive techniques, Sexual behavior.

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Introduction

Human immunodeficiency viruses (HIV) continue to be a global health issue and pose a formidable challenge in the development of health. By the end of 2020, it has claimed 37.7 million people worldwide, with 1.5 million new cases annually. Every week, around 5,000 thousand women aged 15 –24 become HIV-infected.[1] In Indonesia, the incidence of HIV continues to increase every year. During the last decade, HIV peaked in 2019, reaching 50,282 cases throughout the year. Jakarta, the capital city of Indonesia, became the province with the second-highest cases of HIV in 2019, with 6,701 cases, and reproductive age (25–49 years old) predominates the total HIV patients, accounting for 70.4%.[2]

The term "serodiscordant couple" denotes a partnership in which one individual is HIV-positive while their counterpart is HIV-negative, indicating a difference in serostatus.[3] In developing countries, specifically in HIV prevention programs, serodiscordant couples are a priority.[4] Previous studies conducted in East Africa and South Africa stated that 49% of HIV-positive patients have HIV-negative partners.[5] Furthermore, a study conducted in 24 sub-Saharan countries in Africa demonstrated that the prevalence of serodiscordant HIV couples

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was approximately 30.4%, while the overall seroconversion rate among the group was 29.4%.[6]

Knowledge of HIV is crucial among serodiscordant couples; poor knowledge in these domains can contribute to the risk of HIV transmission between couples. Kilembe et al. reported that the level of knowledge is low among couples in Durban, South Africa.[7] Peltzer et al. also reported that HIV knowledge is still relatively low; only 46.2% of people living with HIV had high knowledge related to HIV.[8] Comprehensive understanding of reproductive health is equally pivotal for couples with serodiscordant statuses. These couples encounter a significant challenge, necessitating accurate information on cohabitation dynamics and protective measures for HIV-negative partners. Furthermore, they possess equal reproductive rights.[9,10]

To the best of our knowledge, there is currently little data on the state of HIV knowledge and reproductive health knowledge among serodiscordant couples, particularly in Indonesia. This study aims to determine HIV and reproductive health knowledge and the reproductive health behavior in HIV patients from serodiscordant couples in the capital city of Indonesia.

Materials and Methods

Study Design and Sampling

The study was conducted in a tertiary hospital in Jakarta, the capital city of Indonesia. The Institutional Ethics Committee of Dr Cipto Mangunkusumo National General Hospital, Jakarta, has approved this study. This descriptive, observational cross-sectional study was conducted from October 2020 to June 2021.

The source population in this study was HIV-positive patients treated at the HIV-integrated center of the Dr Cipto Mangunkusumo National General Hospital, Indonesia. The inclusion criteria in this study were HIV-positive patients from serodiscordant couples, who were of reproductive age (15–49 years), heterosexual couples, married, and willing to participate in this study. While the exclusion criteria in this study were subjects who did not disclose their HIV status to their partners or whose partners' HIV status was unknown, and subjects with inadequate literacy.

The sample size was established separately for each of the three study objectives, and the ultimate sample size was determined by selecting the largest size among them. We used a single proportion formula, 95% confidence level, 10% marginal error, 37% for the proportion of high HIV knowledge levels among HIV-positive patients from the previous study,[8] and 50% for the proportion of reproductive health knowledge levels and reproductive health behaviors (since the proportion was unknown in previous studies). This formula obtained a total sample of 90 for the first objective and 97 for the other two objectives. Ultimately, with the inclusion of the largest sample size among the three objectives and incorporating a 10% allowance for nonresponse, the final determined sample size amounted to 108 participants. A total consecutive sampling technique was employed to select the study participants. Subjects were asked to fill out the questionnaire separately from their partner. The questionnaire consisted of demographic data, knowledge of HIV, knowledge of reproductive health, and reproductive health behavior. A research assistant who has been appointed will supervise the subject when filling out the questionnaire so that there is no bias in the results of filling out the questionnaire.

Source of support: Nil
Conflict of interest: None

Knowledge of Human Immunodeficiency Viruses Measures

The level of HIV knowledge was measured based on the Petros study in Ethiopia, which was adopted in a previous study by Handayani. Petros measures the level of knowledge of HIV based on three components of knowledge, namely knowledge about HIV transmission, prevention, and misperceptions.[11,12] The measurement of HIV knowledge can be seen in Table 1.

Knowledge of Reproductive Health Measures

Since there is no validated questionnaire to evaluate the knowledge of reproductive health related to HIV, we developed a novel questionnaire and examined the validity and reliability of the questionnaire in 30 subjects. We used Cronbach's α value of >0.70 and corrected item-total correlation value of >0.3 to measure the reliability and validity of the questionnaire.

Knowledge of the reproductive health index was built from the answers to a total of 30 questions, consisting of three aspects of knowledge, namely 10 questions about contraception, 10 questions about safe reproduction, and 10 questions about sexually transmitted diseases (STDs). Then the index of reproductive health was categorized as a high level if participants can answer >75% of questions correctly, medium level if participants can answer 56–75% of questions correctly, and low level if participants can answer <56% of questions correctly.[13]

Sexual and Reproductive Health Behavior Measures

World Health Organization (WHO) emphasizes having pleasurable and safe sexual experiences, able to reproduce, and deciding whether or not to do so. Based on this statement, we decide that the sexual and reproductive health behaviors measured in this study were contraceptive behavior (condom use), risky sexual behavior (multiple sexual partners, anal intercourse), and safe reproduction in HIV patients [antiretroviral drugs (ARV) adherence and the use of assisted reproductive technology].[9,10]

Statistical Analysis

The analysis of data was performed using the 23rd version of the IBM Statistical Package for the Social Sciences (SPSS) statistics. Kolmogorov–Smirnov and Shapiro–Wilk tests were used to analyze its normality. Demographic data were analyzed descriptively numerically and categorically; knowledge and behavior variables were analyzed descriptively and categorically, the results were presented in the form of frequency (*n*) and percentage (proportion). For analytical purposes, categorical variables were analyzed by the Chi-squared or Fisher's exact test; a p-value < 0.05 was considered statistically significant.

Ethical Approval

This study was approved by the Ethics Committee of the Faculty of Medicine from Universitas Indonesia on 8th July 2019 (reference number: KET-776/UN2.F1/ETIK/PPM.00.02/2019). Respondents were provided with detailed information by the researchers regarding the research procedures. Informed consent was made for the respondents to choose to participate or decline. All gathered data will be kept confidential, and respondents have the right to receive information about any discoveries arising from the conducted examinations.

Table 1: Human immunodeficiency viruses knowledge measurement method

Variable	*Score*
Knowledge about routes of HIV transmission	
Sharing contaminated sharp tools such as razors and needles can cause HIV transmission	1
HIV can be passed from mother to child during pregnancy	1
HIV can be passed from mother to child during childbirth	1
HIV can be passed from mother to child during breastfeeding	1
Total score	4
Good knowledge of HIV transmission if score ≥ 3	
Poor knowledge of HIV transmission if score < 3	
Knowledge about HIV prevention	
A person can reduce the chances of contracting HIV by being faithful to his/her sexual partner	1
A person can reduce the chances of contracting HIV by always using a condom during sexual intercourse	1
Total score	2
Good knowledge of HIV prevention if score 2	
Poor knowledge of HIV prevention if score < 2	
Knowledge about HIV misperceptions	
HIV cannot infect a person through mosquito bites	1
HIV cannot infect a person by eating together with an HIV-infected person	1
A person cannot get HIV through magic or curses	1
A person infected with HIV can look healthy	1
Total score	4
Good knowledge of HIV misperceptions if score 2	
Poor knowledge of HIV misperceptions if score < 2	
Level of HIV knowledge	
Good knowledge of HIV transmission	1
Good knowledge of HIV prevention	1
Good knowledge of HIV misperceptions	1
Total score	3
Low if score < 2	
Moderate if score = 2	
High if score = 3	

Results

Demographic Characteristics

There were 108 subjects who filled out the questionnaire. Table 2 presents a summary of the basic demographic characteristics of participants. The mean age of our participants was 39.6 ± 7.2 years old. Most participants (73.1%) gained information about HIV from mass media (radio, television, newspapers, leaflets/flyers, and the internet), followed by healthcare workers (56.5%), colleagues/friends (52.8%), schools/teachers/books (9.2%).

Demographic characteristics based on the number of marriages, the duration of being married, their children's HIV status, and reproductive plans are also summarized in Table 2. A total of 77 out of 108 participants (71.3%) were married once, and 90 participants (83.3%) were married for >2 years. As many as 43 participants (39.8%) have not tested their children for HIV infection, with the number of male participants being higher than females (51.5 vs 21.4%), and there were six participants from HIV-positive women (5.6%) who had HIV-positive children. More than half of the participants (54.6%) still want their reproductive function.

Participant's Knowledge about HIV

The knowledge of HIV examined in this study consists of HIV transmission, HIV prevention, and HIV misperceptions. The distribution of knowledge about HIV among participants can be seen in Table 3. As many as 59% of participants in this study had a high level of HIV knowledge. Meanwhile, 36% of participants had a moderate level of knowledge, and only 5% had poor knowledge about HIV.

Participant's Knowledge about Reproductive Health

Most participants (76%) had a moderate level of knowledge about reproductive health, while 23% had a high level of knowledge, and only 1% had poor knowledge. Table 4 presents the distribution of respondents who provided correct answers.

Prevalence of Sexual and Reproductive Health Behaviors in Participants

The sexual and reproductive health behaviors examined in this study were condom use, multiple sexual partners, anal intercourse, adherence to ARV, and the use of assisted reproductive technology. As many as 43 subjects (39.8%) always used condoms during sex, 63 subjects (58.3%) did not have multiple sexual partners, and only 11 subjects (10.2%) had performed anal intercourse. A total of 104 participants (96.3%) were in routine antiretroviral therapy (ART). However, none of the participants had used assisted reproductive technology.

Table 2: Demographic characteristics of the participants

Variable	*HIV-positive men N = 66*	*HIV-positive women N = 42*
Age (years)		
Mean ± standard deviation	42.39 ± 6.13	35.26 ± 6.68
Religion		
Moslem	49 (74.2)	34 (81)
Christian	10 (15.2)	6 (14.3)
Catholic	3 (4.5)	2 (4.7)
Buddhist	4 (6.1)	0 (0)
Race		
Bataknese	12 (18.2)	2 (4.8)
Betawi	16 (24.2)	11 (26.2)
Javanese	16 (24.2)	7 (16.7)
Sundanese	9 (13.6)	14 (33.3)
Ambonese	0 (0)	1 (2.3)
Others	13 (19.8)	7 (16.7)
Income		
Low income	18 (27.3)	16 (38.1)
Middle-to-low income	23 (34.8)	15 (35.7)
Middle-to-high income	18 (27.3)	10 (23.8)
High income	7 (10.6)	1 (2.4)
Educational level		
Low	4 (6.1)	12 (28.6)
Middle	33 (50)	19 (45.2)
High	29 (43.9)	11 (26.2)
Job		
Entrepreneurs	43 (65.2)	8 (19)
Housewives	0 (0)	23 (54.8)
Private sector workers	12 (18.2)	8 (19)
Civil workers	3 (4.5)	0 (0)
Farmworkers	0 (0)	2 (4.8)
Unemployed	5 (7.6)	0 (0)
Others	3 (4.5)	1 (2.4)
Source of information/knowledge (participants can choose more than one answer)		
Mass media	54 (81.8)	25 (59.5)
Schools/teachers/books	2 (3)	8 (19)
Colleagues/friends	36 (54.5)	21 (50)
Healthcare workers	34 (51.5)	27 (64.2)
Number of marriage		
Once	54 (81.8)	23 (54.8)
More than once	12 (18.2)	19 (45.2)
Duration of being married		
< 2 years	6 (9.1)	12 (28.6)
≥ 2 years	60 (90.9)	30 (71.4)
Living children and their HIV status		
Yes, HIV status has not been tested yet	34 (51.5)	9 (21.4)
Yes, HIV tested nonreactive	21 (31.8)	19 (45.2)
Yes, HIV tested reactive	0 (0.0)	6 (14.3)
No living children	11 (16.7)	8 (19.1)
Reproductive plan		
No	32 (48.5)	17 (40.5)
Yes	34 (51.5)	25 (59.5)

Table 3: Distribution of HIV knowledge among participants

Variable	*Frequency*	*Percentage (%)*
Knowledge about routes of HIV transmission		
Good	72	66.7
Poor	36	33.3
Knowledge about HIV prevention		
Good	96	88.9
Poor	12	11.1
Knowledge about HIV misperceptions		
Good	104	96.3
Poor	4	3.7
Level of HIV knowledge		
Low	5	5
Moderate	39	36
High	64	59

The Association between HIV and Reproductive Health Knowledge on Sexual and Reproductive Health Behavior

The association between HIV and reproductive health knowledge on sexual and reproductive health behavior is not statistically significant. These results can be seen in Table 5.

Discussion

In this study, only 59% of participants had a high overall knowledge level of HIV. However, compared to previous studies, this study found that HIV knowledge levels were higher than in previous studies where Banagi Yathiraj et al. and Peltzer et al. found 46.2% and 37% of participants had a high level of HIV knowledge.[8,14] One of the factors contributing to this result might be socioeconomic status; subjects with higher socioeconomic status have better access to health services, enabling them to access better treatment and more sources of knowledge than subjects with lower socioeconomic status. Banagi Yathiraj et al. show that subjects with high socioeconomic status tend to have higher knowledge about HIV.[14] In comparison, Haque et al. also showed that educational level, working status, access to mass media, and socioeconomic status may affect the level of knowledge about HIV.[15]

As far as we are aware, there are currently no surveys designed explicitly to assess the extent of reproductive health knowledge in the context of HIV. Therefore, we developed a novel questionnaire to assess the level of knowledge related to HIV. Our study found that only 23% of participants had a high level of reproductive health knowledge; this indicates that reproductive health knowledge even in Jakarta, the capital city of Indonesia is still low. It can be predicted that the reproductive health knowledge in rural areas is even lower. Therefore, extensive reproductive health education and counseling are urgently needed in this country. By looking into each component, knowledge of safe reproduction and prevention of mother-to-child transmission (PMTCT) had the lowest mean score compared to the other two components. This finding could also explain that in this study a relatively high couples do not check their children's HIV status. Therefore, these couples face the risk of HIV transmission when considering family planning.[16] These results may be partly because HIV patients in Indonesia still had low access to correct information about assisted reproductive technology. The poor access to information was also reflected by the fact that none of the participants underwent any

Table 4: Distributions of correct answers on reproductive health

Question	*n (%)*	*Mean score*
Knowledge regarding contraception		
1. Contraception is a method to prevent unwanted childbirths and to set the interval between pregnancies (T)	101 (93.5)	78.5
2. A simple contraceptive method is a method of contraception that a couple can do on their own without the aid of healthcare workers (T)	90 (83.3)	
3. Coitus interruptus (pullout method) is one of the simple contraceptive methods that a couple can do on their own (T)	73 (67.7)	
4. The cost of simple contraceptive methods is expensive (F)	97 (89.8)	
5. A modern contraceptive method is a method of contraception that a couple cannot do on their own without the aid of healthcare workers (T)	71 (65.7)	
6. Sterilization is a permanent contraceptive method (T)	61 (56.5)	
7. The goal of contraception is to improve the health status of a mother, a child, and their family (T)	92 (85.2)	
8. Proper use of condoms can prevent the transmission of HIV (T)	86 (79.6)	
9. Proper use of condoms prevent pregnancies? (T)	101 (93.5)	
10. Proper use of condoms can reduce one's risk of contracting HIV? (T)	76 (70.4)	
Knowledge regarding safe reproduction and PMTCT		
1. HIV may cause fertility disorders, either in males or in females (F)	26 (24.1)	41.8
2. Artificial insemination is a safer way for people with HIV to have children, which may be conducted at any time regardless of viral load status (F)	5 (4.6)	
3. *In vitro* fertilization is a safer way for people with HIV to have children, which may be conducted at any time regardless of viral load status (F)	7 (6.5)	
4. Sperm washing is one of the safest reproductive options in HIV couples, followed by artificial insemination (T)	30 (27.8)	
5. Assisted reproductive technology reduces the risk of horizontal or vertical HIV transmission may occur (T)	33 (30.6)	
6. The risk of HIV transmission between serodiscordant couples can be reduced by regular use of ARVs (T)	100 (92.6)	
7. The use of ART after performing activities with a high risk of HIV transmission should not be more than 72 hours (T)	20 (18.5)	
8. Every pregnant mother must be tested for HIV and other STDs (T)	90 (83.3)	
9. HIV-positive mothers may breastfeed their children (F)	72 (66.7)	
10. A combination of breastmilk and formula milk may be given to babies born from HIV-positive mothers (F)	68 (63.0)	
Knowledge regarding STDs		
1. STDs are a group of diseases involving the genital organs caused by ancestral curses on disobedient people (F)	103 (95.4)	75.8
2. Syphilis, gonorrhea, and genital herpes are several diseases included in the group of STDs (T)	92 (85.2)	
3. HIV is a part of STDs (T)	98 (90.7)	
4. STDs are caused by having sex too often (F)	52 (48.1)	
5. STDs can be transmitted through leftovers of food/drinks taken by STD sufferers (F)	96 (88.9)	
6. Using public toilets and swimming pools with people with STDs is a risk factor for STD transmission (F)	92 (85.2)	
7. Pain while urinating and whitish-yellowish thick mucus coming out from the urethral orifice are signs of STDs (T)	62 (57.4)	
8. STDs may deteriorate the function of the female internal genital organ (T)	27 (25.0)	
9. STDs may be prevented by taking herbal drinks (F)	90 (83.3)	
10. Avoiding multiple sexual partners may prevent someone from contracting STDs (T)	107 (99.1)	

(F) false ; (T) true

procedure of assisted reproductive technology services, including artificial insemination and *in vitro* fertilization. This result warrants further research to identify the level of knowledge of HIV patients about assisted reproductive technology in developing countries, particularly in Indonesia. Research conducted by Zhang et al. in Canada showed that 78% of HIV-positive women stated they needed more information regarding assisted reproductive technology, and 59% of subjects were interested in doing the procedures.[17] Counseling about assisted reproductive technology to HIV patients is crucial, as it may enable them to choose a safer reproductive option, leading to a lower risk of HIV transmission.

As much as 60.2% of participants did not use condoms regularly during sexual intercourse. This result is almost two times higher than a previous study in Indonesia, which stated that 32.2% of people with HIV do not consistently use condoms during intercourse.[18] Another study by Reis et al. in Brazil also reported that 29% of serodiscordant HIV couples did not use condoms consistently during sexual intercourse.[19] In serodiscordant couples, unprotected sex increases the risk of transmitting HIV to HIV-negative partners. The goal of condom use in serodiscordant couples is to suppress the viral burden rate from the HIV-positive partner to the HIV-negative partner during sexual intercourse and prevent the transmission of other STDs. These results enlighten us that further investigation is needed to investigate why participants did not use condoms consistently and the factors associated with inconsistent condom use. In addition, it is necessary to be reminded again about the

Table 5: The association between HIV and reproductive health knowledge on sexual and reproductive health behavior

	Condom use			
Variable	*Consistent N (%)*	*Inconsistent N (%)*	*p-value*	*Odds ratio (95% confidence interval)*
HIV knowledge				
High	29 (67.4)	35 (53.8)	0.159[cs]	1.77 (0.78–3.96)
Low-moderate	14 (32.6)	30 (46.2)		
Reproductive health knowledge				
High	14 (32.6)	11 (16.9)	0.059[cs]	2.37 (0.95–5.89)
Low-moderate	29 (67.4)	54 (83.1)		
	Multiple sexual partner			
Variable	*Yes N (%)*	*No N (%)*	*p-value*	*Odds ratio (95% confidence interval)*
HIV knowledge				
High	26 (57.8)	38 (60.3)	0.791[cs]	0.90 (0.41–1.96)
Low-moderate	19 (42.2)	25 (39.7)		
Reproductive health knowledge				
High	8 (17.8)	17 (27)	0.263[cs]	0.59 (0.23–1.51)
Low-moderate	37 (82.2)	46 (73)		
	Anal intercourse			
Variable	*Yes N (%)*	*No N (%)*	*p-value*	*Odds ratio (95% confidence interval)*
HIV knowledge				
High	5 (45.5)	59 (60.8)	0.350[f]	0.57 (0.15–1.88)
Low-moderate	6 (54.5)	38 (39.2)		
Reproductive health knowledge				
High	2 (18.2)	23 (23.7)	>0.999[f]	0.72 (0.14–3.55)
Low-moderate	9 (81.8)	74 (76.3)		
	ARV adherence			
Variable	*Yes N (%)*	*No N (%)*	*p-value*	*Odds ratio (95% confidence interval)*
HIV knowledge				
High	62 (59.6)	2 (50)	>0.999[f]	1.48 (0.20–10.89)
Low-moderate	42 (40.4)	2 (50)		
Reproductive health knowledge				
High	25 (24)	0 (0)	0.571[f]	n/a
Low-moderate	79 (76)	4 (100)		

CS, Chi-squared test; f, Fisher's exact test

importance of consistent condom use as an essential preventive measure between serodiscordant couples.

A total of 41.7% of the subjects in this study had multiple sexual partners. The prevalence of multiple sexual partners is varied in each study. Studies by Beyeza-Kashesya et al. and Reis et al. reported a prevalence of 18.6 and 34.4%, respectively.[19,20] Contrary to these results, a study by Tadesse reported a high prevalence of 66.7% (6/11) of serodiscordant partners having multiple sexual partners.[21] The high prevalence warns us that this behavior is at risk of transmitting HIV, wherein previous studies stated that multiple sexual partners were one of the factors causing inconsistent condom use, which will increase HIV transmission among serodiscordant partners.[19,20]

The likelihood of HIV transmission is higher during unprotected receptive anal intercourse compared to unprotected receptive vaginal intercourse. Based on existing evidence, the estimated risk of HIV acquisition is approximately 18 times greater for women engaging in unprotected receptive anal intercourse than for those involved in unprotected receptive vaginal intercourse.[22] Although the prevalence of anal intercourse in this study was relatively low, the results did not mean that the subjects had understood that anal intercourse had a higher risk of HIV transmission. Although the prevalence of anal intercourse in this study was relatively low, the results did not mean that the subjects had understood that anal intercourse had a higher risk of HIV transmission. This result may be due to the fact that in Indonesia, anal intercourse is still considered taboo based on the cultural perspective and norms of society. Religious views also play a role, in which Islam, as the dominant religion in our settings, completely prohibits this behavior.[23]

Most participants (96.3%) admitted taking ARVs regularly, which could reduce transmission rates between serodiscordant partners.[24,25] Women with HIV who take ARV before conception may reduce perinatal transmission.[26] Several factors can affect adherence to taking ARV drugs. Suryana et al. identified employment status, type of antiretroviral medication, and family

support as factors linked to adherence to ART among individuals living with HIV.[27] Another study by Weaver et al. in Jakarta also proved that social support has a positive impact on the adherence of HIV-positive patients to take ARVs, by reminding patients to take their medication on time, helping them take ARVs at health facilities, and minimizing the impact of stigma and social discrimination experienced by HIV patients.[28]

Despite the acknowledged potential of assisted reproductive technology to mitigate the risk of transmission to uninfected partners and offspring, none of the participants in this study utilized such reproductive technologies. These results could be related to the lack of counseling and education regarding assisted reproductive technology in HIV patients to facilitate informed decision-making about safe childbearing. Health facilities capable of using assisted reproductive technology are also relatively limited and expensive in Indonesia, so most people, especially HIV-positive patients, have limited access to assisted reproductive technology. In addition, the use of assisted reproductive technology is still controversial. The idea of offering assisted reproductive technology to HIV serodiscordant couples generates concerns about safety and public health (such as the risk of contaminating other embryos and the risk of virus transmission to clinical and laboratory staff and other couples using the same facilities). However, the use of assisted reproductive technology for HIV serodiscordant partners tends to result in more benefits than harm and does not violate ethical principles.[29]

It's important to highlight that the initial purpose of this research was to conduct a descriptive analysis aimed at assessing the extent of HIV knowledge and reproductive health understanding among individuals who are HIV-positive, specifically those within serodiscordant couples. Additionally, the study sought to explore the reproductive health behaviors exhibited by this particular group. We found that there was no significant relationship between knowledge and behavior of HIV and reproductive health. One of the factors that contributed to the finding is the relatively small number of participants in this study. This study should also consider the presence of confounding factors that can interfere with the results. Further study is needed with a larger sample size to measure the analytical relationship between variables.

Conclusion

Most participants had a moderate-to-high level of knowledge about HIV and a moderate level of knowledge in reproductive health. Many respondents had multiple sexual partners and did not use condoms consistently. Education and regular counseling on HIV and reproductive health, including but not limited to regular condom use, should be warranted for serodiscordant couples as it may reduce the risk of HIV transmission to HIV-negative partners. Access to information about assisted reproductive techniques should also be adequately facilitated, as it may significantly reduce the risk of vertical HIV transmission.

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