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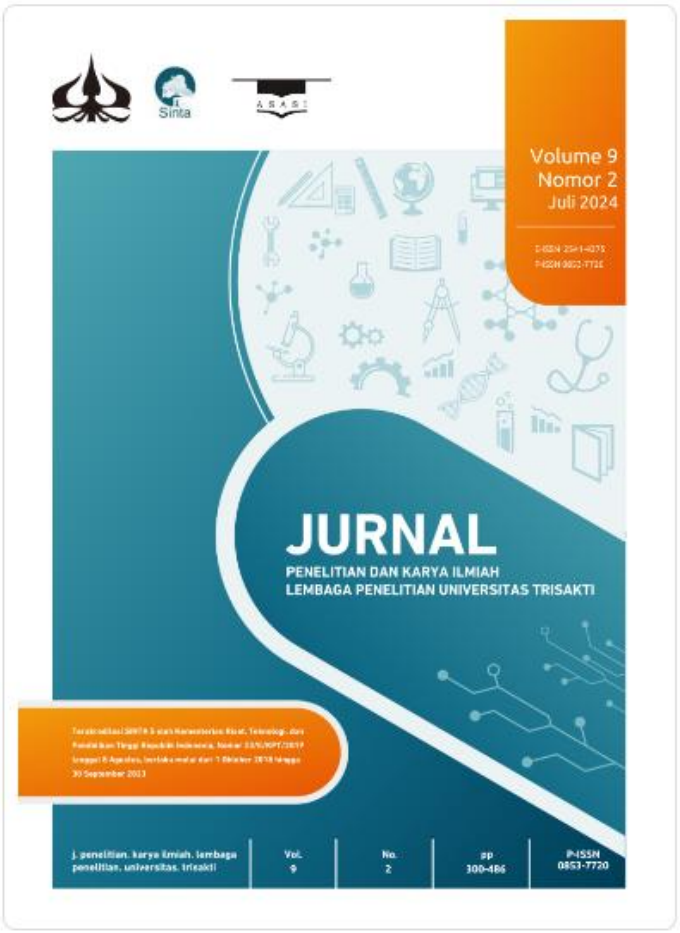

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Nurhikmah Budi Hartanti

Jurusan Arsitektur, Fakultas Teknik Sipil dan Perencanaan, Universitas Trisakti, Jakarta, Indonesia

Email: nurhikmah@trisakti.ac.id

Oknovia Susanti

Fakultas Teknik, Universitas Andalas, Padang, Indonesia

Email: oknovia.s@eng.unand.ac.id

Rani Kurnia

Institut Teknologi Bandung, Bandung, Indonesia

Email: ranikurnia@itb.ac.id

Winnie Septiani

Fakultas Teknologi Industri, Universitas Trisakti, Jakarta, Indonesia

Email: winnie.septiani@trisakti.ac.id

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Universitas Al Muslim, Aceh, Indonesia

Email: syifa.mpbiounsyiah@gmail.com

Octarina Willy

Fakultas Kedokteran Gigi, Universitas Trisakti, Jakarta, Indonesia

Email: octarina@trisakti.ac.id

Reno Pratiwi

Fakultas Teknologi Kebumian dan Energi, Universitas Trisakti, Jakarta, Indonesia

Email: reno.pratiwi@trisakti.ac.id

Cahaya Rosyidan

Fakultas Teknologi Kebumian dan Energi, Universitas Trisakti, Jakarta, Indonesia

Email: cahayarosyidan@trisakti.ac.id

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HIV/AIDS KNOWLEDGE IMPROVES ANTIRETROVIRAL DRUG COMPLIANCE

Naufal Rifqian[1], Dian Mediana[2*]

[1]Fakultas Kedokteran Universitas Trisakti, Jakarta, 11440, Indonesia
[2]Departemen Anatomi, Fakultas Kedokteran Universitas Trisakti, Jakarta, 11440, Indonesia
*Penulis koresponden: dianmediana@trisakti.ac.id

ABSTRACT

Antiretroviral (ARV) therapy compliance is very important for people living with HIV/AIDS (PLWHA) and their support group. Effective ARV medication was essential for HIV infected patients to improve their health, reduce progression, reduce HIV drug resistance, prolong patient life expectancy, and decrease risk of HIV/AIDS transmission to others. Many factors caused non-adherence to ARV drugs. This study aimed to determine the relationship between education, HIV/AIDS knowledge level and ARV compliance. This study was cross-sectional design using consecutive non-random sampling with total sample of 34 subjects. Data were collected using questionnaire. The number of subject conducted in Public Heatlh Center of Cibatu District, Cikarang, Indonesia from October to November 2018. Chi-Square and Fisher test was used to analysed data. Most of the respondents were males, 20-25 years old, intermediate education, HIV/AIDS knowledge level was high, and had good ARV compliance level. There was a significant relationship between education, HIV/AIDS knowledge and ARV medication compliance.

ABSTRAK

Kepatuhan terapi antiretroviral (ARV) sangat penting bagi orang dengan HIV/AIDS (ODHA) dan kelompok pendukungnya. Pengobatan ARV yang efektif sangat penting bagi pasien yang terinfeksi HIV untuk meningkatkan kesehatan mereka, mengurangi perkembangan penyakit, mengurangi resistensi obat HIV, memperpanjang harapan hidup pasien, dan mengurangi risiko penularan HIV/AIDS kepada orang lain. Banyak faktor yang menyebabkan ketidakpatuhan terhadap obat ARV. Penelitian ini bertujuan untuk mengetahui hubungan pendidikan dan tingkat pengetahuan HIV/AIDS dengan kepatuhan ARV. Penelitian ini merupakan penelitian cross-sectional dengan menggunakan metode konsekutif non-random sampling dengan jumlah sampel sebanyak 34 subjek. Data dikumpulkan dengan menggunakan kuesioner. Penelitian dilakukan di Puskesmas Kecamatan Cibatu, Cikarang, Indonesia dari bulan Oktober hingga November 2018. Uji Chi-Square dan Fisher digunakan untuk menganalisis data. Responden sebagian besar berjenis kelamin laki-laki, berusia 20-25 tahun, berpendidikan menengah, tingkat pengetahuan HIV/AIDS tinggi, dan tingkat kepatuhan ARV baik. Terdapat hubungan yang signifikan antara pendidikan, pengetahuan HIV/AIDS dengan kepatuhan pengobatan ARV.

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1. INTRODUCTION

Antiretroviral (ARV) therapy in Indonesia began in 2005. The report from the Ministry of Health of the Republic of Indonesia showed that in 2005 the number of people living with HIV AIDS (PLWHA) who received ARV drugs was 3,904 people (82.4%) out of 4,375 people who met the ARV requirements (T. Yamamoto, 2006). In 2013 the Indonesian government launched the strategic use of antiretroviral therapy (SUFA) intervention. The programe were *to identify* high-risk people, *to treat* eligible PLWHA and t*o retain* them in care (Adeniyi, 2018) (Azhar, 2023). The number of people living with HIV who received ARV treatment until 30 June 2021 was 28.2 million people, where the PLWHA in adults was 36.0 million and in children was 1.7 million (UNAIDS, 2021). However, compliance to treatment remains was very important, as a key challenge for HIV programs to achieve optimal health outcomes. The World Health Organization (WHO) defines treatment compliance as "the extent to which a person's behavior-taking medications, following a diet and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider" (Li, 2017) (kartika, 2021).

Antiretroviral therapy compliance is very important for PLWHA and for others around him. Eighty percent of non-ART compliance may cause treatment failure (Siraj, 2021). Effective ARV medication was essential for HIV infected patients to improve their health, reduce progression, reduce HIV drug resistance, prolong patient life expectancy, and decrease risk of transmission to others in AIDS (Grant-McAuley, 2020; Kumar, 2021; Susmiati, 2021; Craker, 2019). High levels of adherence have been demonstrated to be directly related to reduced in the babies' HIV acquisition risk (Adeniyi, 2018). In contrast, poor adherence to ARV medication has been associated with poor treatment outcomes, emergence of resistance, patients' dissatisfaction, increased healthcare expenditure, and deaths (Adeniyi, 2018).

Many factors for PLWHA were not adhering to taking ARV drugs. There were limitations in health services such as the distance between the patient's house and the hospital and the cost of transportation and CD4 test which was relatively expensive, bored with taking medicine or often forgetting to take medicine, not being strong against the side effects that occur after taking ARV drugs, stigma from the environment that makes most people living with HIV feel uncomfortable, feeling bored because ARV drugs must be taken every day (Sukmawati, 2021). Study conducted in the United States with racial and ethnic minority youth found that nearly 40% of young people living with HIV (YPLH) evidenced suboptimal adherence. ARV medication adherence is affected by demographic factors such as age and gender; treatment factors such as treatment experience, motivation to take ARV as prescribed and social support; and behavioral health risks such as mental health problems and

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substance use. Poor social support, low ARV self-efficacy, advanced HIV disease, psychological distress, depression, and substance use have all been found to negatively impact adherence among YPLH (Craker, 2019).

The study in Edmonds (2021) showed that education and knowledge about HIV/AIDS and ARV medication was not affecting adherence to taking ARV medication. Factors that influence drug adherence were history of change in ARV drugs, perceived benefits of ARV drugs, family support and support from health workers. Bukenya et al. (2019) in Uganda, showed the factors that influence drug adherence are alternative medicine which some people still believe about alternative treatment. Motazedian et al. (2018) in Shiraz, Iran showed that the prevalence of medication adherence in other regions with lower economic level was same. To improve patient compliance, they should provide motivational interventions and social and occupational support. Sukla et al. (2016) in India showed that the prevalence of medication adherence was influenced by busy work so that they forgot to take ARV drugs.

This study aimed to determine the relationship between education and knowledge on ARV compliance, specifically PLWHA; the group of subjects who are transmitters and vulnerable groups affected by HIV/AIDS.

2. MATERIAL AND METHODS

This study was an observational study with a cross-sectional design. The study was conducted in the Public Health Center of Cibatu District, Cikarang, West Java Province, Indonesia between October-November 2018. The population in this study were patients who were on ARV medication that met the inclusion criteria and willing to become respondents by signing an informed consent form. A sample of 34 patients that met inclusion criteria was selected in this study using consecutive non-random sampling method.

The dependent variable was compliance to ARV. The independent variable were education level and knowledge on HIV/AIDS. The inclusion criteria were HIV/AIDS patients, HIV/AIDS patients on ARV, patients who were literate. The exclusion criteria were ARV drugs withdrawal and psychiatric patients.

Gender was defined as a characteristic of subjects categorized into two groups, male and female. The data were collected from questionnaires. For the purpose of data analysis, it was transformed into dichotomous data, coded 1 for male and 2 coded for female.

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Age was defined as a characteristic of subjects categorized into three groups, 20-25 years old, 26-30 years old, and 31-34 years old. The data was taken from questionnaires. For the purpose of data analysis, it was transformed into dichotomous data, coded 1 for 20-25 years old, coded 2 for 26-30 years old, and coded 3 for 31-34 years old.

Education level was defined as the last formal education level attended by the patients. The data was taken from questionnaires and coded 1 for primary school, 2 for junior high school, 3 for senior high school, and coded 4 for bachelors' degree.

Knowledge of HIV/AIDS was defined as level of patient knowledge about the benefits of ARV, experience of side effects, and HIV/AIDS knowledge. The data was collected from questionnaires and coded 1 for low, 2 for medium, and coded 3 for high.

Compliance to ARV was defined as patient compliance based on the last missed treatment, schedule accuracy and ARV drug use rules. The data was taken from questionnaire and scored using the Nursalam scoring system. For the purpose of data analysis, it was coded, 1 for no compliance, 2 for less compliance, and coded 3 for good compliance.

The instrument used in this study was primary data obtained from HIV/AIDS knowledge questionnaire and ARV compliance given to patients with HIV/AIDS treated at the Public Health Center of Cibatu District, Cikarang, Indonesia. Knowlegde level used the HIV Knowledge Questionnaire (HIV-KQ) which consisted of 18 questions with 3 answer choices: true, false, don't know (Kerr, 2015). Score 0–6 = low category, 7–12 = medium category, and 13–18 = high category.

ARV medication compliance using Nursalam scoring system consisting of 11 questions with yes and no answers related to dose appropriateness, frequency, time, and regular CD4 test every 6 months. Score 0–3 = no compliance, 4–7 = less compliance, 8–11 = good compliance (Nursalam, 2015).

Data analysis was done using Chi-square test and Fisher test with SPSS program in Windows operating system. Univariate analysis was used to determine distribution and percentage of each variable. Bivariate analysis was used to determine the significant relationship between dependent and independent variable. Level of significance was $p<0.01$.

Ethical approval of this study was obtained from the medical Ethical Review Board, Universitas Trisakti.

3. RESULTS AND DISCUSSION

The subject characteristics in this study consisted of gender, age, education level, knowledge level, and compliance to ARV medication. The frequency distribution of subject characteristics is

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presented in Table 1 and the relationship between each characteristic with compliance to ARV medication is presented in Table 2.

Table 1 showed that 22 (64.7%) subjects were male and 12 (35.3%) subjects were female. In line with infoDATIN in 2014 showed that male was more suffer from HIV, which was 13,280 (Kemenkes RI, 2020).

Table 1. Frequency Distribution of Gender, Age, Education Level, Knowledge level, and Compliance to ARV Medication

No	Distribution	Frequency (n)	Percentage (%)
1	**Gender**		
	Male	22	64.7
	Female	12	35.3
2	**Age (years old)**		
	20-25	19	55.9
	26-30	11	32.4
	31-34	4	11.8
3	**Education level**		
	Primary School	8	23.5
	Junior High School	8	23.5
	Senior High School	18	52.9
	Bachelor degree	0	0
4	**Knowledge level**		
	Low	6	17.64
	Medium	6	17.64
	High	22	64.71
5	**Compliance to ARV medication**		
	No Compliance	6	17.64
	Less Compliance	6	17.64
	Good Compliance	22	64.71

For the age characteristic, 19 (55.9%) subjects were ± 25 years old, 11 (32.4%) subjects were 26-30 years old, and 4 (11.8%) subjects were 31-34 years old. Most subjects were at age of ± 25 years with 19 individuals. This was similar with data in infoDATIN HIV-AIDS development report in 2014 which showed that the highest percentage was reported from 1987 to September 2014 (Kemenkes RI, 2020).

For the education level, the majority of education level in this study was high school education, with 18 subjects. This result was in line with the study conducted as in Hidayati (2018) which showed that the distribution based on the subject's education was mostly found in high school education and the least at the diploma level.

For the knowledge level, the dominant level of knowledge was high, the results were 22 respondents, while at medium and low knowledge were 12 respondents. This result was in line with

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the study in Dzah (2019), which showed that most respondents knew that HIV/AIDS can be transmitted via sexual intercourse, from mother to child, through sharing needles or syringes and through blood transfusion, that HIV/AIDS cannot be transmitted through handshake and by sharing clothes with an HIV-infected person and by mosquito bite. The majority of the respondents knew HIV/AIDS cannot be transmitted by witchcraft, while a slight majority knew it cannot be transmitted by using the same toilet seat as an HIV-positive patient. Notably, only a slight majority knew HIV/AIDS is not curable. This calls for concerted efforts and health promotion programs in the Public Health Center or in the school to increase their level of knowledge regarding HIV/AIDS to 100%. Inaccurate knowledge might lead to negative attitudes towards PLWHA, which could in turn lead to stigma and discrimination (Dzah, 2019).

For the compliance to ARV medication characteristic, there were 6 (17.6%) subjects had no compliance, 6 (17.6%) subjects had less compliance, and 22 (64.7%) subjects had good compliance to ARV medication. It was similar as in Unzila (2016), which showed very high of compliance to ARV medication was > 95% in the last one month. The study in Rike (2021) said the magnitude of retrospectively self-reported combined adherence (measured by dose, schedule and dietary instructions) to ART in the past seven days was 80.3%. Meanwhile, the study in Yu (2018) showed more than half subjects with HIV/AIDS had compliance to ARV medication below 95% which was 56.3% subjects.

Table 2. The Relationship between Gender, Age, Education Level, and Knowledge Level with Compliance to ARV Medication

Variable	Compliance to ARV Medication							p value
	No Compliance		Less Compliance		Good Compliance		Total	
	N	*%*	*N*	*%*	*N*	*%*	*N*	
Gender								
Male	5	14.70	4	11.76	13	38.23	22	0.542*
Female	1	4.76	2	5.88	9	26.47	12	
Age								
± 25	3	8.82	3	8.82	13	38.24	19	0.779*
26-30	3	8.82	2	5.89	6	17.65	11	
31-34	0	0	1	2.94	3	8.82	4	
Education Level								
Primary School	6	17.64	0	0	2	5.88	8	0.000#
Junior High School	0	0	6	17.64	2	5.88	8	
Senior High School	0	0	0	0	18	52.94	18	
Knowledge Level								
Low	6	17.64	0	0	0	0	6	0.000#
Medium	0	0	6	17.64	0	0	6	
High	0	0	0	0	22	64.71	22	

* Chi-square test
# Fisher test

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Table 2 showed there were 13 (38.23%) male subjects who had good compliance to ARV medication, while 5 (14.70%) had no compliance and 4 (11.76%) subjects had less compliance. In the female subjects, there were 9 (26.47%) subjects had good compliance to ARV medication, while 1 (4.76%) subject had no compliance and 2 (5.88%) subjects had less compliance. Based on gender characteristic, male subjects had most good compliance to ARV medication than female subjects. The p value of relationship between gender and compliance to ARV medication was 0.542 which indicated there was no significant relationship between gender and compliance to ARV medication. From the results of the analysis, it can be concluded that from 22 (64.69%) male subjects in this study, the distribution of compliance to ARV medication was 5 (14.70%) subjects had no compliance, 4 (11.76%) subjects had less compliance, and 13 (38.23%) subjects had good compliance to ARV medication. This was similar with study in Kambu (2016) showed that there was no relationship with gender (p = 0.840). According to Costa (2018) woman visited more regularly and complied better with medication in comparison to men, similar with Yu (2018), female subjects had most good adherence. Different with Abdulrahman (2021) female had lower adherence compared to males. However, this difference did not reach statistical significance. But, in Yu (2018) and Abdulrahman (2021) showed there was no relationship between gender and adherence in ARV medication.

For the age characteristic, there were 13 (38.24%) subjects at ±25 years old had good compliance to ARV medication, while 3 (8.82%) subjects had no compliance and 3 (8.82%) subjects had less compliance. There were 6 (17.65%) subjects at 26-30 years old had good compliance to ARV medication, while 3 (8.82%) subjects had no compliance and 2 (5.89%) subjects had less compliance. There were 3 (8.82%) subjects at 31-34 years old had good compliance to ARV medication, while 1 (2.94%) subject had less compliance. Based on age characteristic, subjects who were at age ±25 years old had most good compliance to ARV medication than subjects at age 26-30 years old and 31-34 years old. The p value of age and compliance to ARV medication was 0.779 which indicated there was no significant relationship between age and compliance to ARV medication. These result was in line with study in Debby (2019) showed that there were 6782 cases (53.5%) in 20-29 age groups. Nguyen et al. (2021) showed that patients at the age ≥35% years old had most good compliance to ARV medication rather than <35 years old.

For the education level characteristic, there were 6 (17.64%) subjects at primary school level had no compliance to ARV medication, while 2 (5.88%) subjects had good compliance. There were 6 (17.64%) subjects at junior high school level had less compliance to ARV medication, while 2 (5.88%) subjects had good compliance. There were 18 (52.94%) subjects at senior high school had good compliance to ARV medication, while no subjects had no compliance and less compliance. Based on

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education level characteristic, subjects with senior high school education level had most good compliance than subjects with primary school and junior high school education level. The p values of education level and compliance to ARV medication was 0.000, which indicated that there was a significant relationship between education and compliance of ARV medication. Similar with study in Kemenkes RI (2020), Campbell (2020), and Hodgson (2014), found that patient's education level was positively associated with ARV medication adherence. Education was also noted as an important factor, Hodgson (2014) found each additional year of schooling increased the likelihood of reporting perfect adherence by 10.6%, that study suggest that higher education contributes to better health literacy.

For the knowledge level characteristic, there were 6 (17.4%) subjects with low knowledge of HIV/AIDS had no compliance to ARV medication, while no subjects had less compliance and good compliance. There were 6 (17.64%) subjects with medium knowledge of HIV/AIDS had less compliance to ARV medication, while no subjects had no compliance and good compliance. There were 22 (64.71%) subjects with high knowledge of HIV/AIDS had good compliance to ARV medication, while no subjects had no compliance and less compliance. Based on knowledge level characteristic, subjects with high knowledge to HIV/AIDS had most good compliance to ARV medication than subjects with low and medium knowledge of HIV/AIDS. The p value of knowledge level and compliance to ARV medication was 0.000, it means that there was a significant relationship between level of knowledge and compliance to ARV medication.

The study in Farhoudi (2018) also showed that barriers to ARV adherence was education because the physicians have not explained well the patients about the illness. Some of the patients even did not know the name of the pills. The study in Ramadhani (2016) also showed that patient knowledge of ARV medication line of treatment and future treatment options as an indicator of adherence to ARV medication.

This was in line with the study in Suswani (2018) and Okuku (2021) the success of managing and caring for HIV/AIDS sufferers depends on the cooperation of health workers with his family patient. PLWHA who have sufficient knowledge about HIV/AIDS, then change their behavior so that they can control their disease condition so that the sufferer can live longer. Counseling is needed to provide knowledge to PLWHA and patient acceptance of their illness. This knowledge includes understanding of ARV therapy, the importance of therapy adherence, possible side effects and length of treatment. With high knowledge, it was hoped that PLWHA will carry out adherence to ARV therapy in accordance with the rules recommended by doctors.

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According to Suswani (2018) knowledge is needed by a person, so that it will facilitate the occurrence of healthy behavior in that person. Knowledge is also intended to provide an understanding of misunderstandings that are not conducive to healthy behavior that can have a bad effect on that person.

The limitation of this study is the sampling was only at one location because of the difficulty of obtaining research permits.

4. CONCLUSIONS

The education and knowledge had a significant relationship with the compliance level to ARV medication. We suggest a special program such as counseling and comprehensive programs for public awareness or socialization about the need for information and support for PLHIV. It is hoped that other researchers will look for other factors that influence compliance to ARV medication in HIV/AIDS patients.

PLHIV with low education and low knowledge need more intervention to improve adherence have the potential to multiply benefits for patients.

5. ACTKNOWLEDGMENTS

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6. CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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HIV/AIDS KNOWLEDGE IMPROVES ANTIRETROVIRAL DRUG COMPLIANCE

Naufal Rifqian[1], Dian Mediana[2*]

[1]Fakultas Kedokteran Universitas Trisakti, Jakarta, 11440, Indonesia
[2]Departemen Anatomi, Fakultas Kedokteran Universitas Trisakti, Jakarta, 11440, Indonesia
*Penulis koresponden: dianmediana@trisakti.ac.id

ABSTRACT

Antiretroviral (ARV) therapy compliance is very important for people living with HIV/AIDS (PLWHA) and their support group. Effective ARV medication was essential for HIV infected patients to improve their health, reduce progression, reduce HIV drug resistance, prolong patient life expectancy, and decrease risk of HIV/AIDS transmission to others. Many factors caused non-adherence to ARV drugs. This study aimed to determine the relationship between education, HIV/AIDS knowledge level and ARV compliance. This study was cross-sectional design using consecutive non-random sampling with total sample of 34 subjects. Data were collected using questionnaire. The number of subject conducted in Public Heatlh Center of Cibatu District, Cikarang, Indonesia from October to November 2018. Chi-Square and Fisher test was used to analysed data. Most of the respondents were males, 20-25 years old, intermediate education, HIV/AIDS knowledge level was high, and had good ARV compliance level. There was a significant relationship between education, HIV/AIDS knowledge and ARV medication compliance.

ABSTRAK

Kepatuhan terapi antiretroviral (ARV) sangat penting bagi orang dengan HIV/AIDS (ODHA) dan kelompok pendukungnya. Pengobatan ARV yang efektif sangat penting bagi pasien yang terinfeksi HIV untuk meningkatkan kesehatan mereka, mengurangi perkembangan penyakit, mengurangi resistensi obat HIV, memperpanjang harapan hidup pasien, dan mengurangi risiko penularan HIV/AIDS kepada orang lain. Banyak faktor yang menyebabkan ketidakpatuhan terhadap obat ARV. Penelitian ini bertujuan untuk mengetahui hubungan pendidikan dan tingkat pengetahuan HIV/AIDS dengan kepatuhan ARV. Penelitian ini merupakan penelitian cross-sectional dengan menggunakan metode konsekutif non-random sampling dengan jumlah sampel sebanyak 34 subjek. Data dikumpulkan dengan menggunakan kuesioner. Penelitian dilakukan di Puskesmas Kecamatan Cibatu, Cikarang, Indonesia dari bulan Oktober hingga November 2018. Uji Chi-Square dan Fisher digunakan untuk menganalisis data. Responden sebagian besar berjenis kelamin laki-laki, berusia 20-25 tahun, berpendidikan menengah, tingkat pengetahuan HIV/AIDS tinggi, dan tingkat kepatuhan ARV baik. Terdapat hubungan yang signifikan antara pendidikan, pengetahuan HIV/AIDS dengan kepatuhan pengobatan ARV.

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1. INTRODUCTION

Antiretroviral (ARV) therapy in Indonesia began in 2005. The report from the Ministry of Health of the Republic of Indonesia showed that in 2005 the number of people living with HIV AIDS (PLWHA) who received ARV drugs was 3,904 people (82.4%) out of 4,375 people who met the ARV requirements (T. Yamamoto, 2006). In 2013 the Indonesian government launched the strategic use of antiretroviral therapy (SUFA) intervention. The programe were *to identify* high-risk people, *to treat* eligible PLWHA and *to retain* them in care (Adeniyi, 2018) (Azhar, 2023). The number of people living with HIV who received ARV treatment until 30 June 2021 was 28.2 million people, where the PLWHA in adults was 36.0 million and in children was 1.7 million (UNAIDS, 2021). However, compliance to treatment remains was very important, as a key challenge for HIV programs to achieve optimal health outcomes. The World Health Organization (WHO) defines treatment compliance as "the extent to which a person's behavior-taking medications, following a diet and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider" (Li, 2017) (kartika, 2021).

Antiretroviral therapy compliance is very important for PLWHA and for others around him. Eighty percent of non-ART compliance may cause treatment failure (Siraj, 2021). Effective ARV medication was essential for HIV infected patients to improve their health, reduce progression, reduce HIV drug resistance, prolong patient life expectancy, and decrease risk of transmission to others in AIDS (Grant-McAuley, 2020; Kumar, 2021; Susmiati, 2021; Craker, 2019). High levels of adherence have been demonstrated to be directly related to reduced in the babies' HIV acquisition risk (Adeniyi, 2018). In contrast, poor adherence to ARV medication has been associated with poor treatment outcomes, emergence of resistance, patients' dissatisfaction, increased healthcare expenditure, and deaths (Adeniyi, 2018).

Many factors for PLWHA were not adhering to taking ARV drugs. There were limitations in health services such as the distance between the patient's house and the hospital and the cost of transportation and CD4 test which was relatively expensive, bored with taking medicine or often forgetting to take medicine, not being strong against the side effects that occur after taking ARV drugs, stigma from the environment that makes most people living with HIV feel uncomfortable, feeling bored because ARV drugs must be taken every day (Sukmawati, 2021). Study conducted in the United States with racial and ethnic minority youth found that nearly 40% of young people living with HIV (YPLH) evidenced suboptimal adherence. ARV medication adherence is affected by demographic factors such as age and gender; treatment factors such as treatment experience, motivation to take ARV as prescribed and social support; and behavioral health risks such as mental health problems and

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substance use. Poor social support, low ARV self-efficacy, advanced HIV disease, psychological distress, depression, and substance use have all been found to negatively impact adherence among YPLH (Craker, 2019).

The study in Edmonds (2021) showed that education and knowledge about HIV/AIDS and ARV medication was not affecting adherence to taking ARV medication. Factors that influence drug adherence were history of change in ARV drugs, perceived benefits of ARV drugs, family support and support from health workers. Bukenya et al. (2019) in Uganda, showed the factors that influence drug adherence are alternative medicine which some people still believe about alternative treatment. Motazedian et al. (2018) in Shiraz, Iran showed that the prevalence of medication adherence in other regions with lower economic level was same. To improve patient compliance, they should provide motivational interventions and social and occupational support. Sukla et al. (2016) in India showed that the prevalence of medication adherence was influenced by busy work so that they forgot to take ARV drugs.

This study aimed to determine the relationship between education and knowledge on ARV compliance, specifically PLWHA; the group of subjects who are transmitters and vulnerable groups affected by HIV/AIDS.

2. MATERIAL AND METHODS

This study was an observational study with a cross-sectional design. The study was conducted in the Public Health Center of Cibatu District, Cikarang, West Java Province, Indonesia between October-November 2018. The population in this study were patients who were on ARV medication that met the inclusion criteria and willing to become respondents by signing an informed consent form. A sample of 34 patients that met inclusion criteria was selected in this study using consecutive non-random sampling method.

The dependent variable was compliance to ARV. The independent variable were education level and knowledge on HIV/AIDS. The inclusion criteria were HIV/AIDS patients, HIV/AIDS patients on ARV, patients who were literate. The exclusion criteria were ARV drugs withdrawal and psychiatric patients.

Gender was defined as a characteristic of subjects categorized into two groups, male and female. The data were collected from questionnaires. For the purpose of data analysis, it was transformed into dichotomous data, coded 1 for male and 2 coded for female.

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Age was defined as a characteristic of subjects categorized into three groups, 20-25 years old, 26-30 years old, and 31-34 years old. The data was taken from questionnaires. For the purpose of data analysis, it was transformed into dichotomous data, coded 1 for 20-25 years old, coded 2 for 26-30 years old, and coded 3 for 31-34 years old.

Education level was defined as the last formal education level attended by the patients. The data was taken from questionnaires and coded 1 for primary school, 2 for junior high school, 3 for senior high school, and coded 4 for bachelors' degree.

Knowledge of HIV/AIDS was defined as level of patient knowledge about the benefits of ARV, experience of side effects, and HIV/AIDS knowledge. The data was collected from questionnaires and coded 1 for low, 2 for medium, and coded 3 for high.

Compliance to ARV was defined as patient compliance based on the last missed treatment, schedule accuracy and ARV drug use rules. The data was taken from questionnaire and scored using the Nursalam scoring system. For the purpose of data analysis, it was coded, 1 for no compliance, 2 for less compliance, and coded 3 for good compliance.

The instrument used in this study was primary data obtained from HIV/AIDS knowledge questionnaire and ARV compliance given to patients with HIV/AIDS treated at the Public Health Center of Cibatu District, Cikarang, Indonesia. Knowlegde level used the HIV Knowledge Questionnaire (HIV-KQ) which consisted of 18 questions with 3 answer choices: true, false, don't know (Kerr, 2015). Score 0–6 = low category, 7–12 = medium category, and 13–18 = high category.

ARV medication compliance using Nursalam scoring system consisting of 11 questions with yes and no answers related to dose appropriateness, frequency, time, and regular CD4 test every 6 months. Score 0–3 = no compliance, 4–7 = less compliance, 8–11 = good compliance (Nursalam, 2015).

Data analysis was done using Chi-square test and Fisher test with SPSS program in Windows operating system. Univariate analysis was used to determine distribution and percentage of each variable. Bivariate analysis was used to determine the significant relationship between dependent and independent variable. Level of significance was $p<0.01$.

Ethical approval of this study was obtained from the medical Ethical Review Board, Universitas Trisakti.

3. RESULTS AND DISCUSSION

The subject characteristics in this study consisted of gender, age, education level, knowledge level, and compliance to ARV medication. The frequency distribution of subject characteristics is

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presented in Table 1 and the relationship between each characteristic with compliance to ARV medication is presented in Table 2.

Table 1 showed that 22 (64.7%) subjects were male and 12 (35.3%) subjects were female. In line with infoDATIN in 2014 showed that male was more suffer from HIV, which was 13,280 (Kemenkes RI, 2020).

Table 1. Frequency Distribution of Gender, Age, Education Level, Knowledge level, and Compliance to ARV Medication

No	Distribution	Frequency (n)	Percentage (%)
1	**Gender**		
	Male	22	64.7
	Female	12	35.3
2	**Age (years old)**		
	20-25	19	55.9
	26-30	11	32.4
	31-34	4	11.8
3	**Education level**		
	Primary School	8	23.5
	Junior High School	8	23.5
	Senior High School	18	52.9
	Bachelor degree	0	0
4	**Knowledge level**		
	Low	6	17.64
	Medium	6	17.64
	High	22	64.71
5	**Compliance to ARV medication**		
	No Compliance	6	17.64
	Less Compliance	6	17.64
	Good Compliance	22	64.71

For the age characteristic, 19 (55.9%) subjects were ± 25 years old, 11 (32.4%) subjects were 26-30 years old, and 4 (11.8%) subjects were 31-34 years old. Most subjects were at age of ± 25 years with 19 individuals. This was similar with data in infoDATIN HIV-AIDS development report in 2014 which showed that the highest percentage was reported from 1987 to September 2014 (Kemenkes RI, 2020).

For the education level, the majority of education level in this study was high school education, with 18 subjects. This result was in line with the study conducted as in Hidayati (2018) which showed that the distribution based on the subject's education was mostly found in high school education and the least at the diploma level.

For the knowledge level, the dominant level of knowledge was high, the results were 22 respondents, while at medium and low knowledge were 12 respondents. This result was in line with

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the study in Dzah (2019), which showed that most respondents knew that HIV/AIDS can be transmitted via sexual intercourse, from mother to child, through sharing needles or syringes and through blood transfusion, that HIV/AIDS cannot be transmitted through handshake and by sharing clothes with an HIV-infected person and by mosquito bite. The majority of the respondents knew HIV/AIDS cannot be transmitted by witchcraft, while a slight majority knew it cannot be transmitted by using the same toilet seat as an HIV-positive patient. Notably, only a slight majority knew HIV/AIDS is not curable. This calls for concerted efforts and health promotion programs in the Public Health Center or in the school to increase their level of knowledge regarding HIV/AIDS to 100%. Inaccurate knowledge might lead to negative attitudes towards PLWHA, which could in turn lead to stigma and discrimination (Dzah, 2019).

For the compliance to ARV medication characteristic, there were 6 (17.6%) subjects had no compliance, 6 (17.6%) subjects had less compliance, and 22 (64.7%) subjects had good compliance to ARV medication. It was similar as in Unzila (2016), which showed very high of compliance to ARV medication was > 95% in the last one month. The study in Rike (2021) said the magnitude of retrospectively self-reported combined adherence (measured by dose, schedule and dietary instructions) to ART in the past seven days was 80.3%. Meanwhile, the study in Yu (2018) showed more than half subjects with HIV/AIDS had compliance to ARV medication below 95% which was 56.3% subjects.

Table 2. The Relationship between Gender, Age, Education Level, and Knowledge Level with Compliance to ARV Medication

Variable	Compliance to ARV Medication							p value
	No Compliance		Less Compliance		Good Compliance		Total	
	N	*%*	*N*	*%*	*N*	*%*	*N*	
Gender								
Male	5	14.70	4	11.76	13	38.23	22	0.542*
Female	1	4.76	2	5.88	9	26.47	12	
Age								
± 25	3	8.82	3	8.82	13	38.24	19	0.779*
26-30	3	8.82	2	5.89	6	17.65	11	
31-34	0	0	1	2.94	3	8.82	4	
Education Level								
Primary School	6	17.64	0	0	2	5.88	8	0.000#
Junior High School	0	0	6	17.64	2	5.88	8	
Senior High School	0	0	0	0	18	52.94	18	
Knowledge Level								
Low	6	17.64	0	0	0	0	6	0.000#
Medium	0	0	6	17.64	0	0	6	
High	0	0	0	0	22	64.71	22	

* Chi-square test
# Fisher test

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Table 2 showed there were 13 (38.23%) male subjects who had good compliance to ARV medication, while 5 (14.70%) had no compliance and 4 (11.76%) subjects had less compliance. In the female subjects, there were 9 (26.47%) subjects had good compliance to ARV medication, while 1 (4.76%) subject had no compliance and 2 (5.88%) subjects had less compliance. Based on gender characteristic, male subjects had most good compliance to ARV medication than female subjects. The p value of relationship between gender and compliance to ARV medication was 0.542 which indicated there was no significant relationship between gender and compliance to ARV medication. From the results of the analysis, it can be concluded that from 22 (64.69%) male subjects in this study, the distribution of compliance to ARV medication was 5 (14.70%) subjects had no compliance, 4 (11.76%) subjects had less compliance, and 13 (38.23%) subjects had good compliance to ARV medication. This was similar with study in Kambu (2016) showed that there was no relationship with gender (p = 0.840). According to Costa (2018) woman visited more regularly and complied better with medication in comparison to men, similar with Yu (2018), female subjects had most good adherence. Different with Abdulrahman (2021) female had lower adherence compared to males. However, this difference did not reach statistical significance. But, in Yu (2018) and Abdulrahman (2021) showed there was no relationship between gender and adherence in ARV medication.

For the age characteristic, there were 13 (38.24%) subjects at ±25 years old had good compliance to ARV medication, while 3 (8.82%) subjects had no compliance and 3 (8.82%) subjects had less compliance. There were 6 (17.65%) subjects at 26-30 years old had good compliance to ARV medication, while 3 (8.82%) subjects had no compliance and 2 (5.89%) subjects had less compliance. There were 3 (8.82%) subjects at 31-34 years old had good compliance to ARV medication, while 1 (2.94%) subject had less compliance. Based on age characteristic, subjects who were at age ±25 years old had most good compliance to ARV medication than subjects at age 26-30 years old and 31-34 years old. The p value of age and compliance to ARV medication was 0.779 which indicated there was no significant relationship between age and compliance to ARV medication. These result was in line with study in Debby (2019) showed that there were 6782 cases (53.5%) in 20-29 age groups. Nguyen et al. (2021) showed that patients at the age ≥35% years old had most good compliance to ARV medication rather than <35 years old.

For the education level characteristic, there were 6 (17.64%) subjects at primary school level had no compliance to ARV medication, while 2 (5.88%) subjects had good compliance. There were 6 (17.64%) subjects at junior high school level had less compliance to ARV medication, while 2 (5.88%) subjects had good compliance. There were 18 (52.94%) subjects at senior high school had good compliance to ARV medication, while no subjects had no compliance and less compliance. Based on

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education level characteristic, subjects with senior high school education level had most good compliance than subjects with primary school and junior high school education level. The p values of education level and compliance to ARV medication was 0.000, which indicated that there was a significant relationship between education and compliance of ARV medication. Similar with study in Kemenkes RI (2020), Campbell (2020), and Hodgson (2014), found that patient's education level was positively associated with ARV medication adherence. Education was also noted as an important factor, Hodgson (2014) found each additional year of schooling increased the likelihood of reporting perfect adherence by 10.6%, that study suggest that higher education contributes to better health literacy.

For the knowledge level characteristic, there were 6 (17.4%) subjects with low knowledge of HIV/AIDS had no compliance to ARV medication, while no subjects had less compliance and good compliance. There were 6 (17.64%) subjects with medium knowledge of HIV/AIDS had less compliance to ARV medication, while no subjects had no compliance and good compliance. There were 22 (64.71%) subjects with high knowledge of HIV/AIDS had good compliance to ARV medication, while no subjects had no compliance and less compliance. Based on knowledge level characteristic, subjects with high knowledge to HIV/AIDS had most good compliance to ARV medication than subjects with low and medium knowledge of HIV/AIDS. The p value of knowledge level and compliance to ARV medication was 0.000, it means that there was a significant relationship between level of knowledge and compliance to ARV medication.

The study in Farhoudi (2018) also showed that barriers to ARV adherence was education because the physicians have not explained well the patients about the illness. Some of the patients even did not know the name of the pills. The study in Ramadhani (2016) also showed that patient knowledge of ARV medication line of treatment and future treatment options as an indicator of adherence to ARV medication.

This was in line with the study in Suswani (2018) and Okuku (2021) the success of managing and caring for HIV/AIDS sufferers depends on the cooperation of health workers with his family patient. PLWHA who have sufficient knowledge about HIV/AIDS, then change their behavior so that they can control their disease condition so that the sufferer can live longer. Counseling is needed to provide knowledge to PLWHA and patient acceptance of their illness. This knowledge includes understanding of ARV therapy, the importance of therapy adherence, possible side effects and length of treatment. With high knowledge, it was hoped that PLWHA will carry out adherence to ARV therapy in accordance with the rules recommended by doctors.

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According to Suswani (2018) knowledge is needed by a person, so that it will facilitate the occurrence of healthy behavior in that person. Knowledge is also intended to provide an understanding of misunderstandings that are not conducive to healthy behavior that can have a bad effect on that person.

The limitation of this study is the sampling was only at one location because of the difficulty of obtaining research permits.

4. CONCLUSIONS

The education and knowledge had a significant relationship with the compliance level to ARV medication. We suggest a special program such as counseling and comprehensive programs for public awareness or socialization about the need for information and support for PLHIV. It is hoped that other researchers will look for other factors that influence compliance to ARV medication in HIV/AIDS patients.

PLHIV with low education and low knowledge need more intervention to improve adherence have the potential to multiply benefits for patients.

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6. CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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