The Correlation between CD4 Count Cell and Opportunistic Infection among HIV/AIDS Patients

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Abstract. The objective of this study is to know the correlation between CD4 count cell and opportunistic infection among HIV/AIDS patients. The design of this research is analytical observational by using Cross Sectional approach. The data are taken retrospectively based on medical record of the patients in Mardi Waluyo Hospital in Blitar from March to July 2018. The diagnosis is done by ELISA laboratory Checking. The number of sampling are 48 patients which is got by purposeful sampling technique. From 48 subjects of the research, there are 16 men and 32 women. The result of this study reveals that CD4 count cell of HIV/AIDS patients is 165.27 cell/mm³ in average. The lowest CD4 count cell is 25 cell/mm³ and the highest of CD4 cell count is 450 sel/mm³. The patients of HIV/AIDS who get opportunistic infection is 68.8%, and those who have not opportunistic infection is 31.2%. The analysis using spearman-rho shows that there is correlation between CD4 count cell and opportunistic infection with p=0.00 with strong correlation (r=0.732). It is hoped that the result of this study can be a new literature, and can be discussed about add value of CD4 count cell in managing of HIV patients who get infection, so it can be managed opportunistic infection early.

Keyword : CD4 count cell, HIV/AIDS, opportunistic infection

1. Introduction
Human Immunodeficiency Virus (HIV) infection is a global problem which get special attention widely in the world. In 2017 World Health Organization (WHO) announced that 36.9 million people in the world were infected by HIV with the highest prevalency in Africa. Asia was in the third with 3.5 million people got HIV after America. The last phase of HIV infection is Acquired ImmunoDeficiency Syndrome (AIDS), which need incubation period between 10 to 13 years. The journey of HIV infection in the body is begun by attacking Cluster of Differentiation 4 (CD4) cell that causes the decreasing of the body defense system [1]. CD4 checking is to complete clinical check in order to decide if the patient needs infection cure and ARV therapy. The decreasing of CD4 in average is around 70-100 cells/mm³/year, by increasing after giving ARV between 50-100 cells/mm³/year.

Indonesia is one of developing countries in Southeast Asia which enable HIV/AIDS to enter easily. Based on data from Disease Control and Prevention Board (Pencegahan dan Pengendalian Penyakit-P2P) of Indonesia, there were 242,699 patients of HIV infection, and 87,453 patients of AIDS until March 2017. Based on data from Indonesia Health Ministry, the number of HIV infection reported until march 2017 is 33,043 patients. The number of HIV/AIDS in Blitar in 2016 were 207 people with 161 HIV patients, and 48 AIDS patients. It is the third rank in East Java after Surabaya and Malang. The number of HIV/AIDS patients will increase from year to year [2][3].

Based on preliminary study done by the researcher of Mardi Waluyo Hospital, until December 2017 there were 127 cases of HIV/AIDS, with 120 cases (94%) of the HIV/AIDS patients had opportunistic infection, 34 cases (26.77%) of HIV/AIDS patients died. The death of HIV/AIDS
patients in Blitar City was 20 cases (83.3%) from 24 cases, so it is concluded that opportunistic infection give high contribution toward mortality rate.

Opportunistic infection is an infection which appears because of body immunity decreasing. This kind of infection can be caused micro organism such as bacteria, fungi, virus and other opportunistic clinical condition called malignancy. Opportunistic infection can attack some organs, such as breath passage, digestive passage, neurological organ, skin, etcetera[4]. The infection of HIV patients depends on infection record, virulence of micro organisme and host related factors. The number of CD4 cell in the blood is an indicator which can be trusted to watch the damage of body immunity because of HIV, and it can be easier for us to make decision in giving ARV (Anti retroviral) cure [6][7]. The goal of this study is to know the correlation between CD4 count cell and opportunistic infection among HIV/AIDS patients. By knowing CD4 cell count, it is hoped that the early management of opportunistic infection can be done early, so the further complication can be prevented and survival rate of HIV/AIDS patients will increase.

2. Literature Review

The previous reasearch which done toward 67 patients of HIV stated that there is positive correlation between the number of limphosit T and CD4 cell in HIV patients with the correlation was (r=0.68; p<0.001) [3]. Although limphosit T count can be used to see infection prognosis of HIV, but it cannot be recommended to check only limphosit T count without checking of CD4 count. The checking of CD4 count becomes the most suitable choice to be early indicator of HIV infection severity level because it is objective, simple, and cheap [8]. The CD4 checking cannot be replaced by checking the number of total limphosit (TLC) [9]. CD4 can be measured directly with decreasing of body immunity, and the risk to get opportunistic infection also taking of diagnostic decision especially for the patients with HIV further level [10]. Some researchs prove that the decreasing of CD4 level shows the increasing of opportunistic infection rate among HIV patients [5]. However, the research result done by other researcher [11] shows that there is no correlation between the number of opportunistic infection with the increasing CD4 count cell (p=0.480). The data state that opportunistic infection is the biggest death causes among HIV/AIDS patients in the world [12].

3. Method

The design used in this research is analytical observational by using Cross Sectional approach. The data are taken restrospectively based on medical record of the patients in Mardi Waluyo Hospital from March to July 2018. The diagnosis is erected by ELISA laboratory Checking. Some examinations can be done to decide HIV/AIDS prognosis, such as Western Blot checking, isolation of virus, antigen detection, and detection of genetics material by using PCR. However, this kind of checking is less effectiveness because it is expensive. To build diagnosis it is done 3 times positive filter by using different reagents[13]. The number of sampling are 48 patients which is got by purposeful sampling technique. From 48 subjects of the research, there are 16 men and 32 women. The other data excluded because they are not complete. The instrument used in this reasearch is variable of CD4 level, and the kind of opportunistic infection used data collecting form. The data are tested by normality test with using shapiro-wilk. It is got that the data are not distributed normally, so the analysis used spearman-rho test with signficantly value (α=0.05)

4. Discussion

The result of the research gets that most of the respondents are women namely 32 respondents (66.7 %). It is in line with the data from Health Department of East Java in 2017 that the number of HIV/AIDS cases among housewives (women) was in the highest rank. The other facts reveal that the risk from syringe used in drugs users change change to heterosexual people who are more dominant. Based on age range, most of the respondents (75%) in 20-39 years old. It is suitable with data of HIV/AIDS cases that based on productive age the range of age in 30-39 years old is high with percentage 15. 2% from all of HIV/AIDS cases. The most HIV/AIDS patients reported in 15-49 years old was (82.9%), > 50 years old (11%) and >60 years old was 3%[14]. This research gets 75% respondents have age range between 20-39 years old, and it
means they are in reproductive age. It means they enable to do sexual activities, and increase the risk of getting HIV infection. The characteristic of research subjects based on gender and age can be seen in Table 1.

**Table 1.** The characteristic of research subjects based on gender and age

| Variable | Number | %  |
|----------|--------|----|
| Gender   |        |    |
| Male     | 16     | 33.3|
| Female   | 32     | 66.7|
| Age      |        |    |
| 1-4 years old | 1 | 2.1 |
| 5-14 years old | 1 | 2.1 |
| 20-29 years old | 10 | 16.7 |
| 30-39 years old | 23 | 47.9 |
| 40-49 years old | 13 | 27.1 |
| 50-59 years old | 2 | 4.2 |

Table 1.2 shows that CD4 count cell of HIV/AIDS patients in Mardi Waluyo Hospital Blitar have 165.27 cell/ml in average. The lowest CD4 count cell is 25 and the highest of CD4 count cell is 450. CD4 count cell < 200 cell/ml that means the high risk from entering opportunistic infection. The high number of patients with CD4 count cell<200 cell/ml is caused since the patients check their condition to the hospital when opportunistic infection have been appeared. It means their immunities has been decreasing which is signed by the number of CD4 cell is under normal. In general, the patients do not go to hospital if they have no complaints, so most of the HIV patients go to the hospital when they are in clinical stadium III. In the other research, it is stated that the HIV/AIDS patients with CD4 < 350 cell/mm sometimes don't feel any signs and symptoms [15].

Table 1.3 shows the characteristic of opportunistic infection group (IO) not IO. The result shows that most of the HIV/AIDS patients in Mardi Waluyo Hospital Blitar get opportunistic infection namely 33 respondents (68.8 %). The result of this research is in line with the research was done [11] that stated the low number of CD4 and severe opportunistic infection was also got among HIV patients who visited hospital with minimal 1 (33.7%) or 2 (34.2%) opportunistic infection. The result of the research done toward 94 HIV patients, there were 62 patients (66%) had more than one opportunistic infections. The most number of opportunistic infection is Tuberculosis. It is said that sub type ofe HIV-1 does not have correlation with CD4 (p=0.14), but it has correlation with opportunistic infection [16].

**Table 1.2 Frequency Distribution of Respondents based on CD4 CountCell**

| Mean | Median | Std. Deviation | Min-maks Value |
|------|--------|----------------|----------------|
| CD4 count cell | 165.27 | 83.00 | 131.436 | 25-450 |

**Table 1.3 Group Characteristic IO dan and Non IO**

| Frequency (n) | Percentage (%) |
|---------------|----------------|
| Opportunistic infection | 33 | 68.8 |
| No opportunistic infection | 15 | 31.2 |
| Total | 48 | 100 |

After being done normality test of the data by using shapiro-wilk, it is got that p=0.000. It can be concluded that the data are not distributed normally, so the researcher did analysis test between variable of CD4 level and opportunistic infection used spearman’s rho test. The cross
table describing the correlation among gender, age, opportunistic infection, and CD4 level can be shown in Table 1.4.

**Table 1.4**: Table of the Spearman correlation among gender, age, CD4 count cell with opportunistic infection on HIV/AIDS patients

|               | Gender | Age | CD4 | IO |
|---------------|--------|-----|-----|----|
| Spearman’s rho| Gender | Age | CD4 | IO |
| Coefficient   | 1.000  | -.058 | .080 | .033 |
| Sig. (2-tailed)| . | .695 | .588 | .823 |
| N              | 48     | 48   | 48   | 48  |

|               | Age | CD4 | IO |
|---------------|-----|-----|----|
| Correlation Coefficient | -.058 | 1.000 | -.520** | -.347* |
| Sig. (2-tailed) | .695 | . | .000 | .016 |
| N              | 48   | 48   | 48   | 48  |

|               | CD4 | IO |
|---------------|-----|----|
| Correlation Coefficient | .080 | .520** | 1.000 | .732** |
| Sig. (2-tailed) | .588 | .000 | . | .000 |
| N              | 48   | 48   | 48   | 48  |

|               | IO |
|---------------|----|
| Correlation Coefficient | .033 | -.347* | .732** | 1.000 |
| Sig. (2-tailed) | .823 | .016 | .000 | . |
| N              | 48   | 48   | 48   | 48  |

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Based on Table 1.4, it can be seen that gender have no correlation with CD4 count which is shown with p value=0.588. The other research said that there was no correlation between gender and the fast decreasing of CD4 count [17]. The same result stated that gender has no correlation toward the increasing of CD4 (p value=0.544) [11]. It is because the severity level of HIV infection influenced by immune status not gender. The further immunodeficiency either on male or female will have impacts to the decreasing of CD4 count which followed by opportunistic infection appearance. In this study, there is significant correlation between CD4 count which is shown by p value=0.00. The same result shows that the number of CD4 decrease significantly in line with increasing of age [18]. The other research stated that there is no correlation between age and gender toward fast decreasing of CD4 count [17][15]. The age factor still becomes the debate among some experts because some researches stated that there is correlation while others stated that there is no correlation. The result of the research which is not in line said that age has no correlation with CD4 count (p=0.112).

The result of this research shows that there is correlation between CD4 level and opportunistic infection with value p=000 with strong correlation value r=0.732. HIV patients with low CD4 count can be caused that the patients have had previous opportunistic infection [19]. When HIV enters the body, so the virus searches CD4 cell and starts to clone itself (virus replication). CD4 is the main target of HIV to destroy the body immune system. If HIV has replicated the virus and leaves the dying CD4, so the new particles virus will look for a new host cell that causes will lower in the body. After passing several time, CD4 cell is destroyed so the immune system decreases and emerges opportunistic infection. Therefore, the control of CD4 count toward someone who infected HIV is very important to know the steps of disease, prognosis and its management [20].
5. Conclusions

CD4 count cell and age have close correlation with opportunistic infection among HIV/AIDS patients, but gender has no correlation with opportunistic infection among HIV/AIDS patients in Mardi Waluyo Hospital Blitar. The lower of CD4 level, the higher risk of opportunistic infection. It is hoped that the result of this research becomes new literature and it can be discussed the add value of CD4 count in managing HIV patients, so it can be done the arrangement of opportunistic infection early.

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