

Correlation of CD4 and Distal Sensory Polyneuropathy in Hiv-Aids Patients

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Abstract

Infection of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) has developed into one of the most important health problems in the world. Distal sensory polyneuropathy (DSP) is the most common complication of peripheral neuropathy in HIV-AIDS. Risk factors associated with DSP are elderly, stage of HIV disease, (cluster differential-4) CD4 count, and high plasma viral load in plasma. To analyze the relationship between CD4 and distal sensory polyneuropathy in HIV-AIDS patients. Subjects of the study examined the degree of severity of distal sensory polyneuropathy by examination of the Surface Nerve Surgical Nerve Speed, then divided into case group and control group. After that, the subjects performed a CD4 count examination. Data analysis using chi-square test. Most body mass index (BMI) subjects did not experience malnutrition by 35% of case group and 35% control group ($p = 1.000$). Most subjects aged ≥ 40 years were 37.5% of case group and 25% control group ($p = 0.102$). Analysis of CD4 relation with Speed of Nerve Surgical Nerve Survival was obtained $p = 0.038$. There was a significant relationship between CD4 and Distal Sensory Polyneuropathy in HIV-AIDS patients. While age and malnutrition were not found a significant relationship with distal sensory polyneuropathy.

Keywords: CD4, distal sensory polyneuropathy, HIV-AIDS

Introduction

Currently, infection human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) has developed into one of the most important health problems in the world. In 2002, the number of new cases of HIV infection worldwide was reported at nearly 3.5 million and among 2.4 million cases of which died from AIDS¹. In 2003, 4.8 million newly infected individuals were infected with HIV. Centers for disease control and prevention (CDC) estimates that 40.000 individuals are infected with HIV each year. World Health Organization (WHO) estimates that the total number of people living with HIV/AIDS worldwide is 42 million². Data from the Ministry of Health of the Republic of Indonesia in

the second quarter of 2010 increased by 1.206 cases of AIDS, thus as of June 2010 cumulative cases of AIDS reported since 1978 amounted to 21.770 from 32 provinces and 300 districts/cities. East Java was ranked second in HIV positive cases was 5.973 cases³.

Along with the development of science and the existence of the drug is much active antiretroviral therapy better, then the life expectancy of patients is increasing, resulting in abnormalities in the peripheral nervous system that appears will increase. Peripheral neuropathy generally occurs early in HIV disease, but it can also occur in all stages of the disease with varying and complex clinical features⁴.

Peripheral neuropathy (DSP), toxic neuropathies (TN), mononeuropathy multiplex (MM, including brachial and lumbar plexus), inflammatory demyelinating polyneuropathy (IDP, acute or chronic type), and progressive polyradiculopathy (PP). DSP is the most common complication and ranges one-third (about 35%) of all HIV patients⁵.

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DSP usually appears in later stages and is estimated to be 30% of patients with CD4 counts less than 200/ μ l. DSP is characterized by the degeneration of axons from sensory fibers with little regeneration of nerve fibers. Risk factors that correlate with DSP include elderly, HIV disease stage, CD4 lymphocyte cell count, and high plasma viral load in plasma, genetic factors may also play a role^{6,7}.

Several factors are suspected to be associate with DSP in HIV patients. These factors include patient age, CD4 cell count, plasma HIV viral load, antiretroviral drugs, and the presence of diabetes mellitus. DSP in the study was upheld from clinical symptoms of the patient ie sensory complaints in the distal. Neural conduction examination (NCS) with the electroneuromyography device (ENMG) was not performed in both studies although the sensitivity was 94% and the specificity was 62.1% for the case of polyneuropathy. Diagnosis of DSP is more objective and more precisely enforced through nerve conduction examination. However, there are some obstacles encountered: ENMG checks are quite expensive, need trained operators, limited tools especially in peripheral areas, and possible risk of HIV transmission to other patients through micro lesions of EMG tools⁸. Therefore, we aimed to analyze the relationship of CD4 with DSP in HIV/AIDS patients.

Method

The subjects of this study were HIV-AIDS patients who were treated at Dr. Soetomo Teaching Hospital Surabaya, Indonesia that fulfill the criteria of inclusion and exclusion. The subjects consisted of two groups: case and control group. Inclusion criteria are: patients diagnosed with HIV/AIDS, aged 17-60 years, had symptoms or asymptomatic Distal Sensory Polyneuropathy, and nerve survival rate (NSR) Survival (≤ 40 m/s in case group and ≥ 40 m/s in the control group)^{9,10}. Exclusion criteria are: taking antiretroviral drugs (ARVs), HIV-AIDS patients using neurotoxic drugs such as Isoniazid, Metronidazol and chemotherapy drugs, and the subject had a history of Diabetes Mellitus. Subjects who were willing to participate in the research first fill out the informed consent sheet.

The procedure of determining the number of subjects includes the identification of HIV-AIDS positive patients using 3 methods of antigen examination for the HIV virus⁹. HIV-AIDS patients performed NSR assessment using Electromyography or EMG (Cadwell Laboratories Inc., Kennewick, USA). The patients were then identified and divided into two groups: case and control group. The results of the process were obtained by 20 case group subjects and 20 control group subjects.

The design of this study using the method of case-control was performed by observational. This research procedure consists of several subject data retrieval including demographic and clinical data. Demographic data include sex, education, and age obtained by means of assessment on the subject. Clinical data include malnutrition and CD4 levels. Malnutrition was known by measuring BMI¹¹. Examination of CD lymphocyte T lymphocyte was performed by taking 2 ml of venous blood stored in EDTA vials. Further examined by flow cytometry method with BD FACS Calibur™ System and with BT Tritest CD3 FITC/CD4 PE/CD45 PerCP reagent.

Before the identification of the subject, the researcher conducted a test of ethics at Dr. Soetomo Teaching Hospital Surabaya Indonesia. Data analysis in this research use frequency analysis which is categorized into 2 categories for each variable. Statistical data aliases using SPSS version 23.0 (SPSS, Inc., Chicago, IL). The statistical test used in this research was the chi-square test ($p < 0.05$). If statistical test requirements are not met then the chi-square test is replaced by a Fisher test.

Results

The results of the assessment indicated that most of the subjects were male (52.5%) of which 32.5% of case group and 20% control group ($p = 0.113$). Most subjects aged ≥ 40 years (62.5%) were 37.5% of case group and 25% control group ($p = 0.102$). The majority of subjects had high school or college education (85%) of 42.5% case groups and 42.5% control group ($p = 1.000$; Table 1).

Table 1. Analysis of CD4 correlation and Distal Sensory Polyneuropathy

Variables	Category	Groups (%)		p
		Case n = 20	Control n = 20	
Sex	Male	32.50	20.00	0.113
	Female	17.50	30.00	
Age	≥ 40 years	37.50	25.00	0.102
	< 40 years	12.50	25.00	
Education	Elementary school, Junior high school	7.50	7.5	1.000
	Senior high school, Bachelor degree	42.50	42.5	
Malnutrition	Yes	15.00	15.00	1.000
	No	35.00	35.00	
CD4	< 185 cell/mm ³	42.50	27.50	0.038
	≥ 185 cell/mm ³	7.50	22.50	

BMI results in subjects were found to be largely malnourished (70%) by 35% of cases and 35% of controls (OR = 1.000; CI 95%, p = 1.000). In this study, there was a statistically significant relationship between CD4 and surgeon nerve neural velocity with p = 0.038 and Odd's Ratio of 4.636 (CI 95%, 1.023 - 21.004), meaning that subjects with low CD4 cell counts were <185 cells/mm³ has a risk of decreasing the Surface Nerve Surge Nerve Speed by 4.6 times compared to subjects with CD4 ≥185 cells/mm³. This indicates that the results of this study were clinically and statistically significant (Table 1).

Discussion

The prevalence of distal sensory polyneuropathy (DSP) is more prevalent in male patients than in female⁶. The factor that causes the prevalence of DSP in the male is higher than for female was the prevalence of male HIV-AIDS patients in Indonesia was almost twice by female patients. In addition, higher male postures lead to more susceptible to length-dependent neuropathy such as DSP^{6,12}.

Older people have a higher risk of developing DSP than younger age. Study in the United States gained an average age of DSP over 45 years, whereas study in Kenya the median age of patients with DSP was 42 years^{6,13}. Moreover, the level of education is not related to NSR Nervus Suralis.

The condition of malnutrition may aggravate the condition of neuropathy in HIV/AIDS patients. In this study, malnutrition status was not related to DSP because malnutrition status is only assessed from Body Mass Index (BMI) ≤18.5. There was no significant association of DSP incidence with weight, height, and BMI¹³. Malnutrition parameter not only obtained from body mass index but also assessed albumin level, hemoglobin level, and level of vitamin B12 in blood^{14,15}.

The CD4 cell count range in this study was 3 to 509 after a statistical analysis found a CD4 border that had a significant association with NSR Sural Nerve was 185. The CD4 count range for the occurrence of Distal Sensory Polyneuropathy between 50-199 cells/mm³⁸. CD4 cell count <170 cells/mm³ had a significant association with the incidence of peripheral neuropathy

in HIV/AIDS patients¹⁵. HIV patients with a CD4 cell count <200 cells/mm³ had a risk of HIV neuropathy and HIV dementia was 3.5 times higher than patients with CD4 count >500 cells/mm³¹⁶. Low CD4 cell counts indicate low immune system HIV/AIDS patients so that macrophage activation is increasing. High macrophage activation leads to the release of proinflammatory cytokines (TNF α , IL1, IL6). Excessive inflammatory cytokines accelerate the apoptotic process of neurons, especially sensory nerve fibers and cause DSP^{17,18}.

Conclusion

The most subjects were male, aged ≥ 40 years and the majority of subjects have a high school or Bachelor's degree. The most subject was not malnourished and patients had CD4 <185 cells/mm³. There was a significant relationship between CD4 and Distal Sensory Polyneuropathy in HIV-AIDS patients. While age and malnutrition were not found a significant relationship with Distal Sensory Polyneuropathy.

Ethical Clearance: This study protocol was approved by ethical clearance Dr. Soetomo Teaching Hospital Surabaya, Indonesia.

Conflict of Interest: There is no conflict of interest in this study.

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