

## ZINC SULFATE INCREASES LYMPHOCYTE CD4 COUNT IN HIV/AIDS PATIENTS AT ICUID DR. SOETOMO HOSPITAL SURABAYA

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### ABSTRAK

*Pasien HIV/AIDS membutuhkan asupan gizi makro dan mikro yang cukup. Zinc adalah komponen penting dari sistem imun dan diperlukan untuk perkembangan imunitas non-spesifik dan imunitas berperantara sel. Penelitian ini bersifat eksperimental dengan desain pretest posttest grup kontrol acak, dan pemberian perlakuan secara double blind. Tujuan penelitian ini adalah menganalisis efek dari pemberian zinc sulfate terhadap jumlah limfosit CD4 pada pasien HIV/AIDS. Populasi penelitian adalah 26 orang pasien HIV/AIDS rawat jalan di UPIPI RSUD Dr. Soetomo Surabaya yang telah menerima terapi ARV selama setahun atau lebih. Sampel dibagi menjadi kelompok perlakuan dan kelompok kontrol. Hasil penelitian menunjukkan bahwa sebagian besar pasien pada kelompok perlakuan memiliki jumlah limfosit CD4 yang meningkat setelah pemberian zinc sulfate dibandingkan dengan sebelum pemberian. Rata-rata selisih jumlah CD4 di kelompok perlakuan tidak berbeda terlalu jauh dengan rata-rata selisih jumlah CD4 di kelompok kontrol. Kami menyimpulkan ada peningkatan signifikan dari jumlah CD4 pada pasien HIV/AIDS rawat jalan di UPIPI RSUD Dr. Soetomo setelah intervensi dengan zinc dibandingkan dengan sebelum intervensi. (FMI 2012;48:17-19)*

**Kata kunci:** pemberian zinc, jumlah CD4, sistem imun

### ABSTRACT

*HIV/AIDS patient requires adequate macronutrient and micronutrient intake. Zinc is an essential component of immune system and vital for the development of non-specific immunity and cell-mediated immunity. The study is an experimental research with randomized control group pretest posttest design, with provision of treatment in double blind and aiming to analyze the effect of zinc sulfate supplementation to lymphocyte CD4 count in HIV/AIDS patient. The population of study was 26 HIV/AIDS outpatients in ICUID Dr. Soetomo Hospital Surabaya receiving ARV therapy for a year or more. The samples were divided to control and treatment group. Results showed most of the patients on treatment group have increased lymphocyte CD4 count after given zinc sulfate supplement. The average variance of CD4 count in treatment group is not significantly greater than control group. We conclude that there is a significant increase of CD4 count after intervention with zinc compared to before intervention on HIV/AIDS outpatient in ICUID Dr. Soetomo Hospital. (FMI 2012;48:17-19)*

**Keywords:** zinc supplementation, CD4 count and immune system

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### INTRODUCTION

A person with HIV/AIDS requires adequate macronutrient and micronutrient intake. However, HIV/AIDS epidemic tends to occur in a society with low nutrition rate (Departemen Kesehatan RI 2005). Additionally, a large part of patients treated in hospitals suffered from HIV wasting syndrome due to change of nutrition during infection (Nasronudin 2007). The change of nutrition could be caused by numerous factors, such as anorexia, hypercatabolism, chronic infection, fever, declining nutrient intake, nausea, vomiting, diarrhea, malabsorption, increasing needs due to loss of nutrient, depression, side effect of drugs, radiation and chemotherapy.

Effort in giving nutrients to patients with HIV/AIDS as a part of comprehensive treatment is encouraged. Attempts on researching the effects of macronutrient supplement had been done in the past. Yuyun (2007) reported that increased protein intake by patients with HIV/AIDS do not show any significant difference in lymphocyte CD4 count between control group and treatment group.

Micronutrient is absolutely needed by patients with HIV/AIDS to build a firm immune system for preventing opportunistic infections. Supply of micronutrient is beneficial to fend off the effect of ROS, increasing life quality and preventing AIDS progression

to sepsis. Vitamins and minerals are crucial for HIV infected individuals on their immune system function, as infection increases the need and usage of antioxidant vitamins (A, C, and E) and minerals (Zinc, Selenium and Iron). Zinc plays a major role in HIV/AIDS, influencing various transcription of gene, mainly genes piloting immune system. Meanwhile, zinc is needed by virus for expression, transcription and integration of genes, as well as hampering tumor necrosis factor (TNF), an important cytokine on triggering HIV wasting process (Nasronudin 2007). The goal of this study was to analyze the effect of giving zinc sulfate supplement and observe the effect on T lymphocytes - CD4 cell count in HIV/AIDS patients.

## MATERIALS AND METHODS

This study was an experimental research with Randomized Pretest Control Group design, with Double Blind treatment administration. Population of study were taken from all HIV/AIDS outpatient who acquired antiretroviral (ARV) at ICUID Dr. Soetomo Hospital Surabaya. A screening is included based on inclusion several inclusion criteria, which are patient is diagnosed with HIV/AIDS, had obtained ARV in the past year with 90% obedience rate from both sexes aged 14-65 years old, living in accessible area, and willing to participate in the study with informed consent signed. Meanwhile, the exclusion criteria in this study are patient is in sick state, in decreased awareness, in depression (psychiatric disorder), ingestion function disorder, and is pregnant or breastfeeding.

Thirty samples were taken randomly from the subpopulation fulfilled the inclusion criteria, divided to two groups, control and treatment group. Fifteen participants as treatment group received zinc sulfate supplement, while fifteen others as control group did not receive zinc sulfate supplement.

The data was collected, processed, edited, coded, and analyzed. Afterwards it was processed both manually and computerized with statistic program available. Output of the statistic was presented on the form of table, diagram and narrated as explanation of table or diagram. Data obtained from measurement result and interview was demonstrated in frequency distribution table and given narration to clarify the meaning. To understand the significance of difference in lymphocyte T – CD4 count on the group pre treatment and post treatment, a paired t samples test was done with trustability degree  $\alpha = 5\%$ . To measure the difference of lymphocyte T – CD4 count between treatment and control group post treatment, an independent samples t test was done with trustability degree  $\alpha = 5\%$ .

## RESULTS

Most respondents were from 30-49 age group, 10 person (76,90%) on treatment group and 9 person (69,20%) on control group. Based on sex, 8 person were male and 5 person were female on treatment group, and 7 person were male, 6 person were female on control group. On the treatment group, 9 person (69,22%) were high school graduate. Based on knowledge, on treatment group 5 person (38,50%) were included as average knowledge level and 5 (38,50%) person were included as high knowledge level, while on control group 6 person (46,15%) were on average knowledge level and 6 person (46,15%) were on high knowledge level. Most respondents (7 person, 53,80%) were entrepreneur on control group. Based on family income, on treatment group 5 person (38,45%) had lower than Rp 850,000 family income, and 5 person (38,45%) had higher than Rp 1,000,000 family income. On control group, 7 person (53,80%) had lower than Rp 850,000 income.

In Indonesia, food are categorized to 4 primary group; staple food, side dish, vegetables/fruits and additional foods. With the right combination and quantity of the 4 primary group of food, all the nutrient needed by a human body to reach optimal health can be achieved (Almatsier 2001). On treatment group, the amount of respondents with diet consisting of staple food, side dish, and vegetables is 6 person (46,10%), while on control group the amount is 8 person (61,50%).

On treatment group, pre-intervention 10 patients (77%) were in averagely decreasing state of CD-4 count. Post-intervention, the amount of patient in heavily decreasing state of CD-4 count reduced to 0, while the amount of patient in slightly decreasing state of CD-4 count increased to 3 patient (23%). On control group, pre-intervention 10 patients (77%) were in slightly decreasing state of CD-4 count. Post-intervention, the amount of patient on averagely decreasing state of CD-4 count increased to 7 (53,90%) while the amount of people on slightly decreasing state of CD-4 count decreased to 6 (46,10%). Result from free sample t-2 test shows no meaningful difference of CD-4 count between treatment and control group pre-intervention ( $p=0,098$ ) and post-intervention ( $p=0,168$ ). While the result from paired sample t-2 test shows a difference on CD-4 count pre and post intervention ( $p=0,000$ ).

In this study, the average CD-4 count of HIV/AIDS patients pre-intervention is minimum 183 cells/mm<sup>3</sup> to maximum 780 cells/mm<sup>3</sup> on treatment group, and minimum 331 cells/mm<sup>3</sup> to maximum 723 cells/mm<sup>3</sup> on control group. Post-intervention, the CD-4 count changed to minimum 197 cells/mm<sup>3</sup> to maximum 961

cells/mm<sup>3</sup>. Treatment group has average difference of CD-4 count  $86,077 \pm 76,180$  cells/mm<sup>3</sup> with range 1 cells/mm<sup>3</sup> to 265 cells/mm<sup>3</sup>. On control group, the average difference of CD-4 count was  $81,307 \pm 78,130$  cells/mm<sup>3</sup> with range 13 cells/mm<sup>3</sup> to 284 cells/mm<sup>3</sup>. Based on the difference of CD-4 count pre and post-intervention, the difference on increase of lymphocyte CD-4 count between control and treatment group can be perceived. The result of statistical test (free sample t-2 test) showed no meaningful difference on the discrepancy of CD-4 count ( $p=0,793$ ).

## DISCUSSION

From profile of respondent (sex and age), we conclude that there is no meaningful difference, as such it is assumed the samples are homogenous on both treatment and control group. Based on family income, generally the higher family income, the better nutrition a patient has, quantitatively and qualitatively. There are other factors as well such as education level, type of job, and the amount of family member, which all can be concluded as homogenous on both group. Based on diet, we conclude that most patients on both treatment and control group does not have sufficient nutrient recommended for health.

There was a significant increase of lymphocyte CD-4 count on HIV/AIDS patient in ICUID Dr. Soetomo Hospital after intervention with zinc sulfate. There was no significant difference on CD-4 count variance between control and treatment group, as in the difference of CD-4 count in control group is not very different to the difference of CD-4 count in treatment group.

## CONCLUSION

Zinc sulfate increases lymphocyte CD-4 count, and as such can be used as an alternative on increasing the immunity of HIV/AIDS patient. A program to enhance the patient's health through counseling, balanced consumption of foods, increasing the diversity of diet, and increasing awareness about nutrient and the importance of macro and micro nutrient to achieve an optimal health state should be carried out. Additionally, a zinc supplementation program for HIV/AIDS patient with decreasing lymphocyte CD-4 count should be provided to increase their immunity. Advanced studies about the increase of CD-4 count with duration of zinc and other micro nutrient supplement, as well as analyzing the effect on immunity and health of HIV/AIDS patient with other factors is needed.

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