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Changes in Anthropometry Measurement among Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) Patients Received Antiretroviral Treatment

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ABSTRAK

Latar belakang: Pada tahun 2005 diperkirakan hampir 38, 6 juta orang terinfeksi HIV dan 2, 8 juta meninggal. Bukti-bukti menunjukkan adanya hubungan yang sangat penting antara nutrisi dan perbaikan keluaran HIV/AIDS. Status nutrisi yang jelek pada HIV/AIDS dapat disebabkan oleh beberapa faktor, yaitu asupan dan absorbsi nutrisi yang tidak memadahi, perubahan metabolik, hipermetabolisme atau gabungan dari kesemuanya, serta perubahan di saluran cerna serta interaksi antara obat dan nutrisi. Walaupun kehilangan berat badan tetap muncul pada era HAART *(highly active antiretroviral therapy),* tetapi efek samping HAART dan lipodistrofi menjadi masalah.
Tujuan: Tujuan penelitian ini untuk mengetahui apakah pemberian anti-retroviral berpengaruh terhadap perubahan nilai antropometri penderita HIV/AIDS.
Metode: Penelitian ini menggunakan metode *one group pre-posttest design* (*quasi experimental*), dengan menilai perubahan nilai antropometri pada subyek penderita HIV sebelum dan sesudah pemberian ARV (Anti-Retroviral). Analisis data dilakukan secara komputerisasi.
Hasil: Didapatkan 30 sampel penelitian dengan perubahan antropometri pre dan post ARV 6 bulan. Berat badan 51.4±9.12 menjadi 53.6±8.68 dengan nilai *p* 0.001, Index Massa Tubuh (IMT) 19.98±3.47 menjadi 20.84±3.35 dengan nilai *p* 0.001 dan lingkar lengan atas 24.13±3.62 menjadi 24.95±3.48 dengan nilai *p* 0.003. Pemberian obat ARV selama 6 bulan berpengaruh terhadap perubahan status gizi penderita HIV yang dinilai dengan ukuran antropometri. Perubahan yang bermakna di dapatkan pada perubahan berat badan, IMT dan lingkar lengan atas. Perubahan nilai antropometri kelompok ARV efavirenz dan non efavirenz yang bermakna didapatkan pada perubahan *Skinfold thickness (ST)* dengan nilai *p* 0.010.
Kesimpulan: Tidak didapatkan perubahan bermakna pada nilai antropometri penderita HIV stadium awal dibandingkan stadium lanjut setelah pemberian terapi ARV 6 bulan.

***Kata kunci*:** *HIV, ARV, antropometri, status nutrisi*

ABSTRACT

Background: Estimated nearly 38.6 million people infected by HIV and 2.8 million died in 2005. Evidence suggests the existence of a very important relationship between the output and improved nutritional status in HIV/AIDS patients. Poor nutritional status in HIV/AIDS can be caused by several factors, namely the intake and absorption of inadequate nutrition, metabolic changes, hyper metabolism, or a combination of these, changes in the gastrointestinal tract as well as interactions between drugs and nutrients. Losing weight remains on the HAART (Highly Active Antiretroviral Therapies) era, but the problems are the side effects of HAART and lipodystrophy.
Objective: The purpose of this study is to determine the provision of anti- retroviral effect on changes in anthropometric values people with HIV/AIDS. **Method:** The study is using the one group pre-posttest design (quasi-experimental), by assessing changes in anthropometric values in subjects with HIV before and after the administration of ARVs. Analysis of the data is computerized by a computer program.

Result: Obtained 30 samples of the study with anthropometric changes pre and post ARVs 6 months. The weight was 51.4 ± 9.12 to 53.6 ± 8.68 with a *p*-value 0.001. Body Mass Index (BMI) was 19.98 ± 3.47 into 20.84 ± 3.35 with a *p*-value 0.001 and upper arm circumference 24.13 ± 3.62 into 24.95±3.48 with a *p*-value 0.003. The provision of antiretroviral drugs for 6 months influences the change in nutritional status of HIV patients are assessed by anthropometric measure. Significant changes in the changes body weight, BMI and upper arm circumference. Changes in anthropometric values ARV Efavirenz group and non-Efavirenz meaningful change significant in skinfold thickness obtained at the value of *p* 0.010.
Conclusion: There were no significant changes in anthropometric values compared to patients with early stage HIV and advanced stage after 6 months of antiretroviral therapy.

Keywords: HIV, antiretroviral drugs, anthropometric, nutritional status

INTRODUCTION

In 2005 estimated nearly 38.6 million people were infected with HIV and 2.8 million deaths. The number of people living with HIV increased 3-4 times since 1990 to 2005, and is likely to continue to rise. Young people (between 15-24 years) constitute half the population of people living with HIV worldwide and about 6000 people were infected in each day.[1]

Complications of Human Immunodeficiency Virus infection (HIV) to changes in nutritional status has been known since the early stages of the epidemic. The spread of HIV around the world have described a complex relationship between complications and nutritional status. At the individual level, many factors contributed to the decline in nutritional and health status of HIV patients.[1]

Poor nutritional status in HIV/AIDS can be caused by several factors. The factors including intake and inadequate absorption of nutrients, metabolic changes, hyper metabolism or a combination of these, and changes in the gastrointestinal tract as well as the interaction between the drug and nutrition.[2]

Complete nutritional assessment should include the following parameters: anthropometry (body measurements, namely height, weight, waist-to-hip circumference, triceps skin fold, upper arm circumference), biochemical, clinical, diet and socio-economy.[3]

HIV/AIDS have a higher risk of malnutrition due to decreased food intake, poor absorption, metabolism changes, treatment with antiretroviral (ARV), and infectious and chronic conditions such as anorexia, diarrhea, fever, nausea and vomiting, mushrooms, and anemia.[4]

Nutritional management in patients with HIV/AIDS becomes increasingly complex since the introduction of antiretroviral agents in the new form of the combination which called Highly Active Antiretroviral Therapy (HAART). HAART gives a better survival time, but the side effects and complications are more frequent. Before the introduction of HAART, weight loss is an issue of major nutrients in patients with HIV and associated with the increased of morbidity and mortality. Although weight loss persists in the era of HAART, but HAART and lipodystrophy side effects is become a problem. Lipodystrophy syndrome is the loss of peripheral subcutaneous fat and visceral adiposity or accompanying the emergence of metabolic abnormalities, especially hyperlipidemia and insulin resistance in patients with HIV/AIDS who receive HAART.[5]

MATERIALS AND METHOD

This research use the design of one group pre-posttest design (quasi-experimental), by assessing changes in anthropometric values in subjects with HIV before and after the administration of ARVs. The study was conducted in the clinic Edelweiss Sardjito General Hospital. The study began in May 2012 until October 2013.

Target populations are people who suffering from HIV/AIDS in Yogyakarta. Affordable populations are those who check into the clinic Edelweiss Sardjito General Hospital. Inclusion criteria were age 18 to 59 years old, newly diagnosed with HIV/AIDS, have not received antiretroviral therapy, and received the maximum ARV therapy less than 3 months, not illiterate and signed informed consent. Exclusion criteria: pregnant women, under steroid therapy, suffering from diabetes mellitus, liver cirrhosis, renal failure and malignancy, physical disability, mental disorder, and refusing to be measured.

Estimated minimum sample size in this study was 24 people thought to be adequate for the observed changes in the value of anthropometry. Continuous data are presented in the form of mean ± standard deviation (SB) and median (with the range of minimum and maximum values), and categorical data are presented in the form of percentage.[6]

In ordinal measurement scale, paired t-test for unpaired use the data to assess the mean difference measured between the measurements before and after when the data is normally distributed, Wilcoxon signed ranks test was used if data were not normally distributed.[6]

Normality of data was assessed by Kolmogorov-Smirnov test. Statistical evaluation is done by a computer program. The difference was statistically significant set of values ($P < 0.05$). [6]

RESULTS AND DISCUSSION

Obtained about 30 patients infected by HIV/AIDS at the Polyclinic Edelweiss Dr. Sardjito General Hospital who met the inclusion criteria. Data collection was performed at the beginning of the study and six months later.

Obtained a mean age of study subjects was 33.57 ± 6.97 years, consist of 19 men (63.3%) and 11 women (36.7%).

Opportunistic infections are found in most study subjects candidiasis 12 (40%), more than two opportunistic infections 7 (23.3%), pulmonary Tb 6 (20%), and 1 each (3.3%) for PCP, CMV, Toxoplasma, skin disorders, HSV.

Table 1 Baseline characteristics of the study subject's patients with HIV / AIDS

Variable	N = 30	
	n (%)	Mean ±SD
Age (year)		33.57±6.97
Sex		
Man	19 (63.3%)	
Female	11 (36.7%)	
Opportunistic infections		
TBC	6 (20%)	
PCP	1 (3.3%)	
CMV	1 (3.3%)	
Toxoplasmosis	1 (3.3%)	
Candidiasis	12 (40%)	
Skin disorders	1 (3.3%)	
HSV	1 (3.3%)	
More than one	7 (23.3%)	
Stage of disease		
Stage I	1 (3.3%)	
Stage II	21(70%)	
Stage III	6 (20%)	
Stage IV	2 (6.7%)	

TBC: Tuberculosis; PCP: *Pneumocystis carinii pneumonia*; CMV: Cytomegalic Virus; HSV: Herpes Simplex Virus

Table 2 Changes in anthropometric values pre ARV and post ARV 6 months

	mean±SD		
Variable (n=30)	Pre ARV	Post ARV	*P* value
Weight (kg)	51.4±9.12	53.6±8.68	0.001
BMI (kg/m^2)	19.98±3.47	20.84±3.35	0.001
Upper arm circumference (cm)	24.13±3.62	24.95±3.48	0.003
Hip circumference (cm)	0.88±0.059	0.89±0.053	0.227
Average Skinfold thickness	9.81±4.66	9.68±4.21	0.690

In this research, comparative value anthropometry between HIV antiretroviral therapy given before and after antiretroviral therapy was given. There are significant differences in changes in body weight of 2.2 kg with a *p*-value of 0.001, change in BMI of 0.86 kg/m^2 with *p* values of 0.001 and upper arm circumference change of 0.82 cm with a *p* value of 0.003.

Previous studies were comparing the anthropometric measure between HIV sufferers and healthy people. Whereas in this study were compared with HIV anthropometric values before the treatment and after 6 months of antiretroviral therapy was given. This study gives different results with previous studies, due to differences in study subjects. In a previous study compared anthropometric values and people with HIV healthy, with HIV results had lower anthropometric values. In this study, the anthropometric values were higher in HIV patients after 6 months of antiretroviral therapy is given.

Changes in anthropometric values in this study were due to the patient's clinical improvement to the antiretroviral therapy. Provision of antiretroviral therapy will cause a variety of metabolic abnormalities, which cause changes in anthropometric values. Many theories explain the effect of antiretroviral drugs on HIV and the effects of ARVs on HIV metabolic abnormalities.[7]

The influence of drugs directly to the HIV virus will cause the eradication of HIV from the body of the patient. Eradication and reduction of virus will contribute to changes in body weight and BMI.[8]

An analyzed to see the changes of the average change in each variable (mean delta and delta) is shown in Table 5. With an average yield of 2.19 weight changes, the average change in BMI of 0.83, the average change in the value of upper arm 0.816, the average change in waist and hip ratio of 0.012, the average change in skinfold Thickness (-0.12).

Table 3 Average changes in anthropometric values pre ARV and post ARV 6 months

Variable	mean±SD
Weight changes	2.19±2.46
Changes in BMI	0.83±0.96
Changes Upper arm	0.82±1.38
Waist Hip Ratio Change	0.012±0.050
Changes in Average skinfold Thickness	-0.12±1.65

From Table 3 above, if depicted in a histogram shown in Figure 1.

Changes in skinfold Thickness (ST) obtained in this study meaningful when viewed on average by comparing changes anthropometry ARV Efavirenz group and non-efavirenz. Based on the stage and type of antiretroviral drugs, changes in skinfold Thickness (ST) gained significantly in the group with advanced HIV who received group therapy Efavirenz (stavudin, lamivudine, Efavirenz).

Changes in Skinfold Thickness (ST) obtained in this study meaningful when

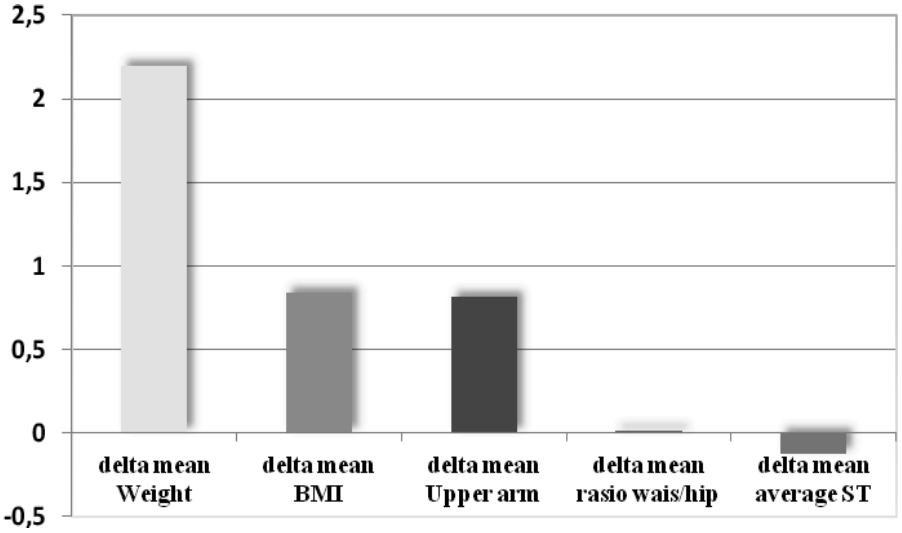

Figure 1 Histogram Mean delta changes anthropometric values before and after 6 months of antiretroviral therapy

Table 4 Average changes in anthropometric values pre and post ARV 6 months in the group Efavirenz and non Efavirenz

Variable	Non Efavirnez (n 13) (mean ranks)	Efavirenz (n 17) (mean ranks)	*p*
Weight change	18.42	13.26	0.113
Changes in BMI	18.46	13.24	0.113
Changes Upper arm	18.27	13.38	0.133
Waist Hip Ratio Change	15.73	15.32	0.902
Changes Average skinfold Thickness	20.12	11.97	0.010

viewed on average by comparing changes anthropometry ARV Efavirenz group and non Efavirenz.

Average change in theory ST is caused as a direct result of antiretroviral therapy or as a result of metabolic abnormalities. There are changes in fat-free mass distribution of muscle in these study subjects. This set of symptoms is often called HIV associated lipodystrophy. This term actually includes abnormal fat accumulation (lipohipertropic) and reduction of local fat tissue (lipotropic), but most patients experienced only lipohipertropic, others experienced lipotropic and experiencing symptoms of a mixed fraction.[9]

Average changes in anthropometric values pre and post antiretroviral HIV drugs 6 months early stage and advanced stage, with the early-stage group n = 22, group advanced stage with n = 8, not found significant changes in anthropometric values between multiple groups of early-stage HIV and HIV advanced stage (table 5).

Limitations of this study that not examined was the patient's viral load, so it cannot be seen fixes the amount of virus after antiretroviral therapy for 6 months. In this study, the evaluation was not performed prior to 6 months of therapy, so it is not known when the changes start happening anthropometric values.

Table 5 Average changes in anthropometric values pre ARV and post ARV 6 months in HIV early stage and advanced stages of HIV

Variable n=30	Early stage (n 22) (mean ranks)	Advanced stages (n 8) (mean ranks)	*p*
Weight change	14.02	19.56	0.126
Changes in BMI	14.18	19.13	0.174
Changes Upper arm	14.43	18.44	0.268
Waist Hip Ratio Change	15.27	16.13	0.813
Changes Average skinfold Thickness	14.75	17.56	0.438

CONCLUSION

The provision of antiretroviral drugs for 6 months influences the change in nutritional status of HIV patients are assessed by anthropometric measure. Significant changes in get to change weight, BMI and upper arm circumference.

Changes in anthropometric values ARV Efavirenz group and non-Efavirenz significant change was found in skinfold thickness.

There were no significant changes in anthropometric values compared to patients with early stage HIV advanced stage after 6 months of antiretroviral therapy.

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