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Assessment of Renal Function and Serum Levels of Alpha Tocopherol in HIV Seropositive Patients on HAART and HAART-Naïve in Katsina, Nigeria

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Abstract: **Increased Oxidative Stress markers in HIV/AIDS Patients may be as a result of free radicals generation and evidence is accumulating that Highly Active Antiretroviral Therapy (HAART) mimics AIDS progression but may be costly due to its Nephrotoxicity. In this research serum levels of Alpha tocopherol (α- tocopherol), Urea, Creatinine as well as CD4 Counts were measured in 70 HIV Seropositive Patients (40 on HAART and 30 HAART-Naïve) and Thirty (30) apparently healthy individuals as controls in Federal Medical Centre Katsina, Nigeria.CD4 Counts, Serum Levels of Alpha tocopherol, Urea and Creatinine of HIV-HAART and HAART Naïve were 0.72±0.27mg/dl, 16.8±5.6 mmol/l, 237±123 µmol/l and 646±254cell/µl and 0.3±0.1mg/dl, 10.4±2.9 mmol/l, 91±26 µmol/l and 364±17 cell/ µl respectively. There were significantly ($p<0.05$) increased CD4 counts, serum levels of Alpha tocopherol, Urea and Creatinine in HIV/AIDS Patients on HAART compared to HAART- Naive. This is an indication that HIV/AIDS are predisposed to oxidative stress and that also HAART has debilitating effects on kidneys.**

Keywords: **HIV/AIDS, HAART, Alpha tocopherol, Urea, Creatinine.**

1. INTRODUCTION

Human immunodeficiency virus (HIV) belongs to a slow replicating retrovirus family that causes Acquired immunodeficiency syndrome (AIDS) (Douek *etal*, 2009), a condition in humans in which progressive letdown of immune system allows life threatening opportunistic infections such as Diarrhoea, tuberculosis, toxoplasmosis, candidiasis, meningitis and cancers to thrive (Weiss, 1993). HIV is a worldwide epidemic expanding in scope and magnitude and affected different populations and geographic regions (Jawetz, 2007).

Antiretroviral drugs are medications used for treatment of retrovirus specifically HIV, when such several drugs, typically three or four are taken in combination, the approach is known as Highly Active Antiretroviral Therapy (HAART) (WHO, 2010). HAART is a combination of two nucleoside (NRTIs) reverse transcriptase and one ARVs NTRIs exclusive (e.g. protease inhibitors, Non-nucleoside reverse transcriptase, chemokine core receptor antagonists etc). Evidence is accumulating that HAART plays a vital role in the reduction of morbidity and mortality rate among HIV/AIDS patient (Fauci and Lane, 2005).

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Alpha tocopherol is the most powerful naturally occurring chain breaking antioxidant vitamins within the biological system (Vasudevan and Sreekumari, 2007). It plays a defensive and protective role in the development of chronic diseases, including diabetes, cancer, hypertension and inflammatory diseases (Wali *et al*, 2014).

2. MATERIALS AND METHODS

Study Population: - Total of Seventy (70) HIV seropositive patients (40 on HAART and 30 HAART Naïve) attending the HIV Clinic in Federal Medical Center, Katsina, Nigeria. And thirty age- and sex- matched apparently healthy subjects as controls.

Blood Specimens:- Blood samples were collected by clean venepuncture into appropriately labeled clean test tubes, without undue pressure on either of the arm or the plunger of the syringe (Cheesbrough, 2004).The samples were allowed to clot at room temperature and centrifuged at 3000rpm for 5 minutes to obtain the sera. The separated sera were transferred into sterile serum bottles and kept frozen at -20°C until used for the assay of serum α-tocopherol, urea and creatinine in batches.

Analytical Methods: - CD4 cell count was measured in accordance with flow cytometry method using cyflow Counter (Partec, Germany). Alpha tocopherol was estimated using method of Neil and Pierson (1963), Urea and Creatinine were determined in accordance with urease and kinetic methods respectively

Statistical Analysis: - The data was entered into a preformed template of SPSS computer software (version 15.0) and was analyzed accordingly. The results were expressed as Mean ± Standard deviation, Student T-test was used for the analysis and the Level of significance was considered at $p<0.05$.

3. RESULTS

Table 1: CD4 cell counts, Serum Levels of Alpha Tocopherol, Urea and Creatinine in HIV on HAART, HAART -Naïve and Control Subjects

VARIABLES	CD4 (cell/µl)	α- Tocopherol (mg/dl)	Urea (mmol/l)	Creatinine (mmol/l)
HIV on HAART (n=40)	646±254	0.72±0.27	16.8±5.6	237±123
HAART-Naive (n= 30)	364±172	0.28±0.11	10.4±2.9	91±26
CONTROL (n=(30)	808±291	0.79±0.29	7.5±2.6	69±12
Probability	<0.05	<0.05	<0.05	<0.05

Values are of Mean ± SD, n = Number of subjects, CD4=Cluster of differentiation type 4,
HAART = Highly Active Antiretroviral treatment,

Table 2: Sex Distribution of CD4 counts, α-Tocopherol, Urea and Creatinine among HIV positive on HAART, HAART-Naive and Control subjects.

Parameters	HIV -HAART		HAART-Naïve		CONTROLS	
	M (n=15)	F(n=25)	M(n=15)	F(n=15)	M(n=18)	F(n=12)
CD4 (cell/µl)	586±265	682±246	330±115	398±212	778±278	853±316
α- tocoph. (mg/dl)	0.7±0.2	0.7±0.3	0.3±0.1	0.3±0.1	0.8±0.3	0.8±0.3
Urea (mmol/l)	17.8±5.9	16.2±5.4	11.6±2.1	9.6±2.5	7.6±2.8	7.4±2.4
Creat. (µmol/l)	314±164	190±53	100±26	82±25	70±13	69±12

Values are of mean±SD, n= number of subjects, M=male, F=female, CD4=Cluster of differentiation type 4,
HAART = Highly Active Antiretroviral treatment.

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Table 3: Percentage of CD4 counts and α- Tocopherol deficiencies of HAART-Naïve in Katsina, Nigeria

Parameters	Mild	Moderate	Severe
HA ART-Naïve CD4 Counts			
Male (n=15)	6.7%	13.0%	0.0%
Female (n=15)	27.0%	20.0%	23.0%
Pool (n=30)	53.0%	27.0%	40.0%
HAART-Naïve α- tocopherol			
Male (n=18)	33.0%	66.7%	0.0%
Female (n=12)	20.0%	80.0%	0.0%
Pool (n=30)	26.7%	73%	0.0%

Values are of mean±SD, HAART = Highly Active Antiretroviral treatment, n = Number of subjects

4. DISCUSSION

HIV/AIDS is a disease spectrum of human defense system caused by infection with HIV (Sepkowitz, 2001). The hypothesis that HIV/AIDS is a disease of increased production of free radicals lead to the finding that higher intake of α-tocopherol could help in neutralizing the effects of radicalized molecules and mimics AIDS progression (Yeldu, 2014).

According to the results obtained from this study, there is significant decrease serum levels of α- tocopherol ($p<0.05$) in HIV positive HAART- Naïve patients compared to HIV-Negative control subjects. Increased oxidative stress in HIV/AIDS results in higher utilization of α- tocopherol and consequently its deficiency. The results were in agreement with those established by (Nkengfack *et al*, 2012). When the result was delineated according to sex, no statistically significant difference ($p<0.05$) was observed between male and female HIV Positive HAART-Naïve Patients.

HAART has been found to cause chronic kidney disease (CKD) and major drugs include Indinavir, Tenofovir and Alazanovir (Kalyesubula and Perazella, 2011). Table 1 shows an elevated serum levels of Urea and Creatinine in HAART Patients compared to HAART-Naïve in each case ($p<0.05$).This is because Kidneys play vital role in metabolism and excretion of antiretroviral drugs which causes the damage and hence the deranged values. This is in line with work performed by Chaisiri *et al.*, (2010) and Cote *et al.*, (2006).

This finding is however in contrast to previous report by Mainasara *et al*, (2014) and Ugwuja (2010) who observed that HAART of Stavudine, Lamivudine and Nevirapine can potentially reverse the HIV/AIDS-related impairments in renal functions. The variance in both findings might be due to the use of different combination of antiretroviral drugs.

Wyalt *et al*, 2009 reported that the major risk factor for acute kidney injury and associated mortality include immunosuppression (< 200 CD4 counts). The results reveals decrease in CD4 counts of HAART-Naïve and consequent elevation of CD4 counts in HAART Patients compared to HIV Negative control subjects. The results further revealed that (53%) and (73%) of HAART-Naïve patients were deficient of CD4 and α- tocopherol respectively.

5. CONCLUSION

In conclusion, results shows a statistical significant increase in the serum levels of α- tocopherol, urea and creatinine in HIV positive patients on HAART compared to HAART-Naïve. Gender has no significant effects on α- tocopherol

6. RECOMMENDATION

Since it has been established that there is reduced serum levels of α- tocopherol in HIV/AIDS patients. Supplementation of α- tocopherol and continuous monitoring of renal function of HIV/AIDS patients should be encouraged.

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