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Vitamin D and insulin resistance in HIV sero positive individuals in Umudike

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Abstract

This study was carried out to determine vitamin D and insulin resistance in HIV sero positive individuals in Umudike, Abia State. Serum vitamin D and insulin concentration of fifty (50) HIV sreo positive individual were compared with fifty(50) apparently healthy individuals as control. 25-OH method was used to determine the concentration of vitamin D while insulin micro plate method was used to determine the concentration of insulin. The mean ± standard deviation for vitamin D is 28 ±7.8ng/ml while that of insulin is 14±7.1µl/ml respectively. this study showed that vitamin D and insulin resistance in HIV sero positive individuals is significantly increased than in control (p=0.05).This difference can be attributed to the prolonged invasion of the system to the HIV infection.

Keywords: Vitamin D , Insulin resistance, HIV sero positive individuals ,Umudike.

Introduction

Human Immunodeficiency Virus is a member of the genus Lentivirus (Garg *et al.*, 2012), Part of the family of retroviridae (Kumar and Viny, 2012).

Many species are infected by Lentiviruses, which are characteristically responsible for long – duration illness with a long incubation period (International Committee on Taxonomy of Viruses, 2002).

Insulin deficiency state in HIV sero-positive individual may be characterized by the patient inability to focus, high blood sugar, intestinal bloating, fat storage difficulty and also increased blood pressure.

Many people with hypertension are either diabetic or pre-diabetic and have elevated insulin level due to insulin resistance which lead to a decrease of arterial wall tension throughout the body and increased blood triglyceride level.

Insulin resistance may arise due to the type of food intake and also due to a disease condition or genetic condition.

Vitamin D refers to a group of fat-soluble secosteriods responsible for enhancing intestinal absorption of calcium, iron, magnesium, phosphate and zinc. In humans, the most important compound in these groups is vitamin D3 also known as cholecalciferol (Alagarasu *et al.*, 2009).

Vitamin D deficiency in the body may cause osteomalasia or rickets (when it occurs in children). In relation to HIV, high vitamin D level was associated with a slower progression of HIV to AIDS (International committee on Taxonomy of Virus, 2002). Women with vitamin D levels above 32ng/ml [80nmol/l) had a 25% lower risk of disease progression (Apard *et al.*, 2009).

Vitamin D reduces the risk of borne mineral lose and osteosporosis (Holick *et al.*, 2006).

Objectives of the study

The objectives of the study include:
1. The level of vitamin D in HIV sero-positive individuals
2. To establish a link between vitamin D level and insulin resistance in HIV sero-positive individual

Materials and Methods

Study area and subjects

The study was conducted in Department of University Health Services, Michael Okpara University of Agriculture, Umudike, Abia State. A total of 50 HIV sero-positive individuals within the age range 21-43 years attending Department of Health Services, Michael Okpara University of Agriculture, Umudike while 50 non HIV positive individuals were the control.

Sample collection

Blood samples were collected from the HIV – seropositive individuals by venipuncture using a sterile 5ml disposable needle. The skin was cleaned with 70% alcohol and allowed to air dry, a tourniquet was tied on the hand above the site of puncture and the 5ml disposable needle and syringe was used to collect 5ml of blood and it was dispensed into a plain bottle and allowed to separate then the serum is collected into a second plain bottle and the container was then labeled with the patients name, laboratory number, sex and age. The sample containers were arranged in a rack, and it was sent to the laboratory for the estimation of vitamin D and insulin.

Insulin estimation

Insulin was determined in sample using the insulin microplate **ELISA Test**

Procedure

0.050ml (50ul) of samples was added into the assigned wells. Then 0.100ml (100ul) of the insulin enzyme reagent was added to each well. It is very important to dispense all reagents close to the bottom of the micro-well and Incubated for 120 minutes at room temperature (20-27^{0}C). 350ul of wash buffer was added, decanted and washed 3 times. 0.1ml of working substrate solution was added to all wells.

Vitamin D estimation

Determination of vitamin D level

Vitamin D was determined in samples using, the Euroimmum (25-OH vitamin D ELISA)

Procedure

200ul of sample was diluted in biotin/sample buffer into each of the microplate wells. Incubate for 2hours at room temperature (+18^{0}C + 0 + 25^{0}C). Then 100ul of enzyme conjugate

(streptavidin – peroxidase) was added into each of the microplate wells and incubate for 30minute at room temperature (+18^{O}C to + 25^{0}C). 100ul of chromogens/substrate solution was added into each of the microplate wells. Incubate for 15 minute at room temperature (+18^{0}C to 25^{0}C) protect from direct sunlight. 100ul of stop solution was added into each of the microplate wells in the same order and at the same speed as the chromogen/substrate solution was introduced. The result was read at a wavelength of 450nm

Results

A total of fifty (50) subjects were used for this study. Fifty (50) sero-positive individuals and fifty (50) apparently healthy individuals were used as control and vitamin D, insulin parameters were analyzed.

The summary of the results obtained from this study are shown in the table below. Details of the results obtained are shown in the appendix.

Table 1: Showing insulin level and vitamin D concentration in HIV-Seropositive individuals with statistical evaluation n = 30 for seropositive individuals and n = 20 for control.

Parameter	Sero-positive individuals	Control	P-Value
	Mean ± S.D	Mean ± S.D	
Insulin	14 ± 7.1 (ulu/ml)	6 ± 0.89(ulu/ml)	0.0001
Vitamin D	28 ± 7.8 (ng/ml)	37 ± 2.65 (ng/ml)	0.0001

In table 1 above, insulin is significantly increased compared to control. Vitamin D is significantly reduced compared to control.

Table 2: showing insulin level and vitamin D concentration in male and female, HIV sero-positive individuals with statistical evaluation n = 10 for male and n = 5 for female

Parameter	Male	Female	P-Value
	Mean ± S. D	Mean ± S. D	
Insulin	18 ± 5.38 (ulu/ml)	5 ± 2.1 (ulu/ml)	0.0001
Vitamin D	26 ± 5.1 (ng/ml)	11 ± 3.3 (ng/ml)	0.0001

In table 2 above, insulin level vitamin D in male is significantly increased more than female.

Table 3: Showing insulin and vitamin D concentration in HIV –Seropositive individuals in respect to resistance to Atazonavir intake n = 8 for insulin and n = 8 for vitamin D

Parameter	HIV Individual	Atazanavir Intake	P- Value
	Mean ± S.D	Mean ± S.D	
Insulin	14 ± 71 (ulu/ml)	17 ± 0.56 (ulu/ml)	0.8514
Vitamin D	28 ± 7.8 (ng/ml)	34 ± 0.63 (ng/ml)	0.0013

In table 3 above, vitamin D and Insulin resistance to atazanavir is significantly increased compared to control.

Table 4: Showing insulin and vitamin D concentration in HIV sero-positive individuals in respect to age range

Parameter	21-33	34-43	P- Value
Insulin	17 ± 2.02 (ulu/ml)	11 ± 1.69 (ulu/ml)	0.0001
Vitamin D	45 ± 2.8 (ng/ml)	17 ± 11.8 (ng/ml)	0.0001

In table 4 above, insulin and vitamin D concentration is significantly reduced in respect to age range of 21-33 years and 34-43 years and above.

Discussion

In this study, insulin resistance in HIV sero-positive individuals is significantly increased compared to control, while vitamin D resistance in HIV sero-positive individuals is significantly reduced compared to control.

Vitamin D and Insulin Level is significantly increased in male than in female infected with HIV.

In respect to the drug atazanavir the insulin and vitamin D resistance in HIV seropositive individual is significantly increased compared to the control while insulin and vitamin D concentration or resistance is significantly reduced in respect to age range of 21-34 years and 34-43 years and above.

Vitamin D and insulin resistance in HIV sero-positive individuals occur due to the malfunctioning of the subject immune response (i.e., the system is compromised).

Higher vitamin D levels were associated with slower progression of HIV to AIDS (International Committee on Taxonomy of Viruses, 2002).

Vitamin D and Insulin reduces the rate of bone mineral loses and osteoporosis (Holick *et al.*, 2006). According to Apard *et al.*, 2009, women with higher vitamin D level above 32ng/ml (80nmol/l had a 25o/v lower risk of disease progression.

Conclusion

Unprotected sex, direct contact with the fluid of the infected person with HIV causes the malfunctioning of the important organs and system of the infected subject leading to the breakdown of the system which increases vitamin D and Insulin resistance in HIV sero-positive individuals.

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