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Bone Disorder in HIV Infected Patients

^{1*}IGBOH, N. M, ²NNAMAH, N.K, ¹ONWUBIKO, D., ¹CHIGBU, L.N., ³AGOMUO, E.N.,
⁶THEANACHO, K.M.E. ⁴ONYESOM, C.A, ⁵MADUAGWUN, C.A, ⁶THEANACHO, K.M.E., ¹EMUCHEY, C.I.

^{1*}College of Medicine and Health Sciences, Abia State University Uturu. Nigeria.

^{2*} Department of chemical pathology, College of Medicine and Health Sciences, Nnamdi Azikwe University Teaching Hospital, Nnewi. Nigeria.

^{3*} Department of Biochemistry, Faculty of Sciences, Imo State University, Owerri, Nigeria.

^{4*} Department of Medical Biochemistry Delta State University, Abraka, Nigeria.

^{5*}Department of Pharmacology, College of Medicine & Health Sciences, Abia State University Uturu. Nigeria

^{6*} Department of Biochemistry, Faculty of Sciences. Federal University of Technology Owerri, Nigeria.

*E-mail: drngomi@yahoo.co.uk

Abstract

The study was carried out on 105 subjects to assess the possible derangement of calcium, phosphorous and alkaline phosphatase in HIV patients and to assess the correlation between those on HAARTS and those not on drugs. Thirty five subjects were used for each group including the control. They were of age 20 to 40 years and are within Aba Metropolitan. Blood samples were obtained from subjects in each group. And those on antiretroviral drugs who have been receiving the treatment for more than 3 months. Blood samples were also collected from HIV negative individuals who invariably serve as control. All analysis was based on colorimetric method. The results obtained were subjected to statistical analysis using one-way analysis of variance. The result apparently, showed a significant increase in the activity of Alkaline phosphatase in HIV patients on drugs compared to those not on drugs and control ($p < 0.05$). Noticeable decrease in the level of calcium was observed in HIV patients not on drugs, compared to others. There was a remarkable decrease in the level of phosphate in these patients as well ($p < 0.05$). From the result obtained which obviously indicated osteopenia. Mineral supplementation is essential particularly for those on antiretroviral drugs.

Key words: Alkaline phosphatase, Calcium, phosphate, HIV and AIDS.

Introduction

HIV infects many cell types in the body leading to diverse immunologic and metabolic effects. Much attention has been paid to emerging complications of HIV infection in patients receiving potent antiretroviral therapy. HIV and diabetes remain two major clinical conditions of high morbidity and mortality particularly in developing countries [1, 2]. The main focus has been on metabolic problems associated with cardiovascular disease such as insulin resistance, hyperlipidemia, and fat redistribution [3, 4, 5]. However, with the increasing life expectancy conferred by the new therapies, there is also an emerging increase in the risk of bone pathologies. The main issues are apparent increased rate of osteonecrosis and increased risk of developing osteopenia and osteoporosis. Decreased physical activity, prolonged bed rest associated with chronic illness, severe weight loss, malnutrition, disruption of the parathyroid hormone axis, and hypogonadism, which are all recognized risk factors for osteoporosis in man, are all common features in advanced HIV infection. Calcium and Vitamin D deficiencies may be risk factors for osteoporosis and bone fractures. It may equally involve the major regulating systems particularly the parathyroid gland, kidney and gastrointestinal tract [6, 7].

The gastrointestinal tract can exhibit low calcium absorption as in malabsorptive states or high calcium absorption as in vitamin D intoxication and the milk-alkali syndrome [8]. The kidney may fail to excrete calcium as in some cases of nephrolithiasis as in renal failure [9, 10]. Incidentally, bone disorders have emerged as a worrisome complication in persons with HIV infection. Several reports have suggested an increased prevalence of osteopenia and osteoporosis in HIV-infected individuals and over the past few years, there have been increasing report of osteoporosis and osteopenia both in adult and children with HIV infection [11]. Though, the causes of bone demineralization in those with HIV infection are unknown. However skeletal fractures associated with osteoporosis can be painful, debilitating and potentially life-threatening offsetting any quality of life advantage gained by current use of antiretroviral therapy [12]. Some studies so far carried, showed evidence of osteopenia in some patient on antiretroviral drugs and those not on drug though this was linked with the degree of viremia. [13,14,15]. Other studies which also showed the same result include those of Knobel [16].

We aimed to determine the Serum levels of calcium and Phosphate. Equally, look at the activity of alkaline phosphatase in HIV positive individuals and those on Antiretroviral Drugs to enable us assess possible variation among the groups.

Material and Methods

The study was carried out on 105 subjects to assess the possible derangement of calcium, phosphorous and alkaline phosphatase in HIV patients and to assess the correlation between those on HAARTS and those not on drugs. Thirty five subjects were used for each group including the control. They were of age 20 to 40 years. Blood samples were obtained from subjects in each group. And those on antiretroviral drugs who have been receiving the treatment for more than 3 months. Blood samples were also collected from HIV negative individuals who invariably serve as control. All analysis was based on colorimetric method. The results obtained were subjected to statistical analysis using one-way analysis of variance Obi [17].

Results and Discussion

The result apparently, showed a significant increase in the activity of Alkaline phosphatase in HIV patients on drugs compared to those not on drugs and control ($p < 0.05$) Table-1. Noticeable decrease in the level of calcium was observed in HIV patients not on drugs, compared to others. There was a remarkable decrease in the level of phosphate in these patients as well ($p < 0.05$). Increase in Alkaline Phosphatase activity could be attributed to the presence of HIV Virus and HIV drugs. The result of the study is in conformity with the reports of other studies which indicated osteopenia as evidence with low calcium and phosphate levels. These include the studies of Hoy [12, 13]. Other studies which also showed the same result include those of Lawal [17, 18, 19].

Decreased physical activity, prolonged bed rest, severe weight loss, malnutrition and malabsorption associated with HIV may account for the low calcium and phosphate observed in HIV patients on drugs and those yet to start the antiretroviral drugs. However the HIV patients had slight increase of these minerals (calcium and phosphate) probably due to the effect of the drugs. Moreso when the levels of calcium and phosphate depletion have been linked with the degree of viremia. [13]. From the result obtained which obviously indicated osteopenia. Mineral supplementation is essential, particularly for those on antiretroviral drugs. This is vital in order to ameliorate their situation.

Table-1: Calcium, Phosphorous and Alkaline Phosphate Levels in Patients Infected with Human Immune Deficiency Virus on drugs and those not on drugs and control.

Parameters	Calcium (mmol/L)	Phosphorous (mmol/L).	Alkaline phosphate (U/L)
HIV Negative Subjects (control)	2.40± 0.06	1.14 ±0.08	63.0± 5.39
HIV Positive Subjects not On drugs	2.20± 0.01	1.00±0.06	150 ± 8.50
HIV Positive Subjects On drugs	2.30± 0.03	1.12±0.07	154± 12.00

*Significant difference $P < 0.05$

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