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Original article

Plasma 25-OH Vitamin D_3 Level in HIV Infected Patients

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Abstract: Vitamin D deficiency affects bone mineral density and immune function and thus may confer adverse outcomes in HIV infected patients. We aimed to determine plasma 25-OH Vit D_3 for evaluation of vitamin D status among HIV infected patients. Medical records were searched retrospectively and data were collected with ethical committee approval. One hundred twenty HIV infected patients who plasma 25-OH Vit D_3 level was determined by liquid chromatography tandem mass spectrophotometer enrolled into the study. Plasma 25-OH Vit D_3 levels of the patients ranged between 4.26 and 68.57 μg/L (mean: 21.71±13.08 μg/L). Normal plasma level (>30 μg/L) was determined only in 26 (21.6%) patients. Female patients had lower plasma level (11.29±4.53 vs 24.19±13.24 μg/L). There was also negative moderate correlation between age and plasma 25-OH Vit D_3 level (r:-0.42). Correlation between CD4 count and plasma 25-OH Vit D_3 level (r:-0.04) was not determined. In conclusion, majority of HIV infected patients (78.3%) had low level of plasma 25-OH Vit D_3. Therefore, it is important to determine vitamin D status of patients and give replacement therapy for its deficiency during care of HIV infected patients.

Key words: Vitamin D, HIV and infection.

Introduction

Vitamin D (Vit D) is an important factor modulating calcium metabolism and bone mineral density. In addition, it has also effects on various organ systems including immune, cardiovascular and central nervous systems (1). Adverse effects of Vit D deficiency on immune system should be considered along with immune system suppression caused by direct action of *Human immunodeficiency virus* (HIV). Longer life expectancy in HIV infected patients by means of current combined antiretroviral therapy (cART) has been emerged another issue related to quality of life. Incidence of bone mineral disorders such as osteopenia and osteoporosis is increasing among HIV infected patients by getting older. Therefore, it is important to maintain normal Vit D status in HIV infected patients for health life. Plasma 25-OH Vit D_3 concentration is the most reliable marker showing body Vit D status (2). As nutritional Vit D is a source of body, it can be synthesized in the body by the action of sun light (3). Vit D deficiency can be caused by various reasons in HIV infected patients (4). The most common two causes are insufficient dietary intake and reduced skin synthesis due to aging, skin hyperpigmentation, reduced sun light exposure and obesity (4). On the other hand inhibition of conversation of Vit D to active metabolites and increased utilization of Vit D for T lymphocyte proliferation and maturation in HIV infection may also leads to Vit D deficiency (5). The study aimed to determine plasma level of 25-OH Vit D_3 in HIV infected patients.

Material-Methods

Data of HIV infected patients followed at tertiary health center in north of Turkey were reviewed retrospectively. HIV infected patients whom plasma 25-OH Vit D_3 levels were determined by liquid chro-

matography tandem mass spectrophotometer method enrolled into the study. Flow cytometric analysis of peripheral blood was performed for enumeration of CD4+ T lymphocyte. Normal, insufficient and deficient Vit D statues was defined as plasma 25-OH Vit D_3 level >30 µg/L, 20-29,99 µg/L and <20 µg/L, respectively. The study was approved by Ondokuz Mayis University Clinical Research Ethics Committee with the number of 2016/155.

Results

One hundred twenty HIV infected adult patients aged between 19 and 69 (mean: 42.66±11.95) years old were enrolled into the study. Ninety seven (81%) patients were male and 23 (19%) were female. Plasma 25-OH Vit D_3 levels of patients were ranged between 4.26 and 68.57 µg/L (mean: 21.71±13.08 µg/L). Normal vit D statues (plasma 25-OH Vit D_3> 30 µg/L) was determined in 26 (%21.6); vit D insufficiency (plazma 25-OH Vit D_3:20-30 µg/L) in 29 (24.2%) and vit D deficiency (plasma 25-OH Vit D_3< 20 µg/L) in 65 (54.1%) patients. Although CD4+ T lymphocyte count was higher in female patients, plasma 25-OH Vit D_3 level was lower than male patients (Table-1). There was not statistical significant differences in CD4+ lymphocyte count between vit D status (p>0,05) (Table 2). Correlation between plasma 25-OH Vit D_3 and CD4+ T lymphocyte count was not determined (r:-0.04) whereas it was determined a moderate negative correlation between age and plasma level of 25-OH Vit D_3 (r:-0.42)

Table 1. CD4+ T cell count, age and plasma 25-OH Vit D_3 levels according to sex of HIV infected patients.

	Female	**Male**	**p**
Number (%)	23 (19)	97 (81)	NA
Age	46.57±11.27	41.73±11.98	p >0.05
CD4+ T cell count	705±263	563±315	p <0.05
Plasma 25-OH Vit D3 level (µg/L)	11.29±4.53	24.19±13.24	p <0.001

NA: Not applicable

Table 2. CD4+ T cell count, age and sex of patients according to Vit D statues.

Vit D Statue	Normal	Insufficient	Deficient	p
Number (%)	26 (21.6)	29 (24.2)	65 (54.2)	NA
Sex (Male/ Female)	26/0	28/1	43/22	NA
Age	40.46 ± 13.27	45.31 ± 12.37	42.35 ± 11.16	>0.05
CD4+ T cell count	611 ± 272	529 ± 301	602 ± 325	>0.05

NA: Not applicable, Vit D Statue: Normal: Plasma 25-OH Vit D_3 level >30 µg/L, Insufficient: Plasma 25-OH Vit D_3 level: 20-29,99 µg/L and Deficient: 25-OH Vit D_3 level <20 µg/L

Discussion

The study showed that plasma 25-OH Vit D_3 was low in HIV infected patients. Female patients had lower Vit D level than male patients and it was decreased by age. In contrast, it was reported that healthy females and male had similar plasma 25-OH Vit D_3 level (22.76±8.52 vs 24.02±16.93 ng/ml) in Turkey (6). One study by Dao *et a.l* reported that plasma 25-OH Vit D_3 levels were lower than 30 µg/L in 71.6% of HIV infected patients in United States of America (7). They also found lower 25-OH Vit D_3 level in female patients in consistence with our study. These studies indicates that HIV infection decreases plasma 25-OH Vit D_3 level more in females than males. The results of our study corroborated with the findings of these other studies that people living with HIV have low level of Vit D (8-11).

There are some proposals for Vit D deficiency in HIV infected patients; HIV decreases vitamin D levels through the action of proinflammatory cytokines results in inhibition of renal hydroxylation and increased consumption of 25-OH Vit D_3 by immune cells (12). In addition, it was shown that anti-retroviral drugs used for the treatment of HIV infection suppress active Vit D synthesis by acting on cytochrome enzyme system (13-14). It is stated that sex and older age are other risk factors for Vit D insufficiency (7).

There are controversial reports regarding effects of Vit D deficiency on CD4+ T lymphocyte count in HIV infected patients (15). Ezeamama *et al*. reported that low level Vit D was associated with impairment of CD4+ T lymphocyte count recovery in HIV-positive patients on combined antiretroviral therapy (cART) (16). On the other hand Sudfeld *et al.* reported that Vit D status was not associated with change in CD4+ T lymphocyte count after cART initiation (17). We did not find correlation between Vit D level and CD4+ T lymphocyte count in our study. Age and sex are important determinants of Vit D status in HIV infected patients however HIV infection and cART may contribute significantly to low level of Vit D.

Recently used cART substantially reduced acquired immunodeficiency syndrome development and related death (18). Therefore life expectancy of HIV infected people has been increasing and, the cause of mortality and morbidity of these people shift toward non-HIV related diseases. When unfavorable effect of Vit D deficiency is combined with negative effects of HIV infection and cART regiments on bone metabolism, it can lead to more damage. It is stated that correction of Vit D deficiency with replacement therapy reduces the inflammation in HIV infected patients (19).

In conclusion, low level of Vit D was determined in high proportion (78.3%) of HIV infected patients and Vit D level would be decrease by getting older. Therefore, Vit D level should be monitored and replaced during follow up of HIV infected people.

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