Is the Paradise in the Caribbean? Prevalence of Hypovitaminosis D in HIV+ Patients Treated at a Clinic in Puerto Rico

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Background

- Vitamin D deficiency has become an even more increasing health concern in the past couple of years due to recent findings of links between hypovitaminosis D and conditions such as cancer, metabolic syndrome, heart disease, and some infectious diseases such as tuberculosis. 2,3
- It is also a risk factor for the development of osteopenia, osteoporosis and fractures; especially in the elderly population. 4
- The vitamin D receptor (VDR) has also been found in adipocytes, suggesting a role in vitamin D fat metabolism (stimulation of adipogenesis and inhibition of lipolysis) increasing the central fat accumulation. 5,6
- A number of genetic polymorphisms in the VDR gene and low vitamin D levels in the elderly population have been discussed in the literature. 7
- Existent studies have demonstrated that HIV+ positive population suffer from low bone density, increasing their risk of fractures which has been linked to the use of highly active antiretroviral therapy (HAART) and even HIV itself. 1-3
- There is limited information regarding vitamin D deficiency in the HIV+ population. Cohort studies have looked at the prevalence of vitamin D deficiency in the HIV+ population and have found a high frequency of vitamin D deficiency in this population especially those receiving HAART. 4-5
- Currently, there are no studies published regarding vitamin D deficiency and insufficiency in HIV+ patients in the Caribbean. (Latitudes 18°00' to 66°37'W).
- Therefore, we want to investigate the prevalence of vitamin D deficiency and insufficiency in ambulatory HIV+ patients that are above 49 years of age with or without antiretroviral regimen, under care at a local outpatient clinic in the Caribbean.
- Our hypothesis is that HIV+ patients with or without HAART who live in the Caribbean have 25-hydroxyvitamin D severe deficiency (≤ 25nmol/L), deficiency (50nmol/L ≤ 75nmol/L).

Methods

- This is a retrospective, observational study in which patient’s clinic records were evaluated to find the prevalence of vitamin D deficiency among this population.
- A comparison between patients with antiretroviral therapy (ART) or without ART was performed. For those on ART we also compared those on a PI based regimen vs. Non-PI (e.g. NNRTI) based regimen.
- Study participants consisted on HIV+ adults > 49 year managed at Centro Ararat who had a Vitamin D level measurement obtained between June to September 2010.
- A data collection tool was designed to gather demographic characteristics (age, gender, race/ethnicity), height, weight, BMI, viral load, CD4 cell count, 25 OH levels, time with HIV infection (date of diagnosis), AIDS defining illness, current or former IV/OD use, current ART therapy (PI or NNRTI based), time on ART (number of years since first ARV regimen), co-morbid conditions, multinutrient use, vitamin D supplementation used and dose, other medications.

Results

- A total of 43 out of 77 reviewed charts met the inclusion criteria. The population was 100% Hispanic and mostly men (63% vs. 37%).
- Mean age was 57 years old. Age ranges were as follow: 50-59 years (77%), 60-69 years (14%), 70-79 years (7%) and ≥ 80 years 2%.
- The most common co-morbid conditions found among study population were: dyslipidemia (63%), hypertension (44%), diabetes (40%), thyroid dysfunction (19%), osteopenia/osteoporosis (14%), chronic kidney disease (14%), malabsorption/IBS/IBD (12%).
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Discussion

- Findings from previous studies suggest that there is a high prevalence of vitamin D deficiency among the HIV population. Although, we were not able to find statistically significant differences on vitamin D levels in our population, we were able to observe a higher trend of deficiency/insufficiency in this population.
- It has been established in the literature that there is a direct proportional relationship between years living with HIV and the development of osteopenia/osteoporosis. However, our results revealed that those who have been infected for ≤ 10 years have more vitamin D deficiency/insufficiency than those infected for ≥ 11 years. Possible confounders are vitamin D consumption among the population that has been infected the longest and the time they have been consuming it and sun exposure (which was not measured).
- Vitamin D deficiency/insufficiency was observed in a higher proportion among patients supplemented with ≤ 800 IU/day of Vitamin D than those who were not on vitamin D supplementation. This could be attributed to non-adherence to vitamin D supplementation.
- Among our population, the major co-morbidities related to vitamin D deficiency/insufficiency were diabetes and chronic kidney disease. Although smoking has been identified as a risk factor for osteopenia/osteoporosis, we were not able to find a correlation between smoking and vitamin D levels in our study population.
- Evidenced-based literature suggests that patients with high BMI are often vitamin D deficient. Our findings did not differ from previous studies. Vitamin D receptor (VDR) involves in the stimulation of adipogenesis, and inhibits the lipolysis as result of severely decrease the expression of PPARs: are possible foundation for the result. Peroxisome proliferator-activated receptor gamma (PPARγ) is necessary for conversion of pre- adipocytes into adipocytes, and is the likely “master regulator” of adipogenesis. Vitamin D3 in optimal levels stabilizes the VDR, preventing the inhibition of adipogenesis through PPARγ mechanism. Further studies assessing these confounders should be performed in the future.
- As we analyzed the ARV regimes along with vitamin D levels, we observed that those patients on PI-based regimens presented vitamin D deficiency/insufficiency more often than those without PI drugs. This finding correlates with previously published studies.
- There are several limitations to this study including: small sample size (n=43), which did not allow us to find statistical significant results, and adherence to vitamin D supplementation was assessed only by prescriptions filled and patient files, and not via other venues. In addition, since this was a retrospective chart review, this opens the door for potential bias such as missed information since the accuracy of the information provided cannot be guaranteed.

Conclusion

- Inadequate vitamin D levels were highly prevalent among HIV+ patients treated at a clinic in the Caribbean. Although, location of the population is in the Caribbean, there were no differences in the solar radiation between seasons, less than 50 percent of the HIV population had the sufficient vitamin D levels. Even in patients using more than 400 IU of vitamin D per day, more than 50% of them had inadequate vitamin D levels. Additional studies in this area are needed to determine the necessary replacement amount of Vitamin D for the HIV infected patients to maintain sufficient levels, and the benefit on insulin resistance, adipogenesis and visceral adiposity reduction.

References