



An Assessment of Frequency of Deficiency of Vitamin D among HIV/AIDS Patients

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Abstract

Background: Literature showed that HIV +ve individuals were deficient for vitamin D as well. Vitamin D deficiency is one of the top most commonly observed abnormality and an independent prognostic marker of HIV disease. The scientific groups' emphases on the likely impact of its dearth on HIV infested populace. One of most communal comorbidities in HIV-1 patients is insufficiency of Vitamin D (Vit D), which is estimated by measuring 25-hydroxyvitamin D (25[OH]D) concentrations. Patients having vitamin D levels < 20ng/ml (50nmol/l) were considered as having vitamin D deficiency. HIV infection & ART (antiretroviral therapy) may create risk factors for insufficiency of vitamin D, it also has a role in slowing down HIV ailment progression.

Methods: A descriptive cross-sectional study was conducted at Medicine Department in Services Hospital Lahore from June 22, 2017 to December 22, 2017. 160 Patients with HIV confirmed by ELISA method were selected by non-Probability Consecutive sampling technique. Data was entered in SPSS v23.0 & Chi square test was applied.

Results: Out of 160, Frequency of Vitamin D deficiency was 111(69.4%). Results demonstrated that majority of patients 74(46.25%) are having disease for 1-3 years. While 54(33.75%) patients are having the disease for <1 year and 32(20.0%) are having the disease for >3 years. There were no significant differences between Vitamin D deficiency with age, gender and duration of HIV/AIDS (p-values 0.123, 0.136 & 0.634 respectively).

Conclusion: Frequency of vitamin D deficiency is very high. This recommends that all HIV positive individuals should be considered for routine screening. Low serum calcium should prompt investigation of 25-OHD levels.

Keywords: AIDS, deficiency, frequency, HIV, Vitamin D

Introduction

Deficiency/scarcity of Vitamin-D, characterize/identify by hypophosphatemia &/or hypocalcemia & osteomalacia as well as rickets in the kids whereas osteomalacia in the grown-ups is nowadays rare in most of the developed

nations. Nevertheless, subclinical scarcity of vitamin-D arises even in the established nations & is linked with enhanced danger/risk of falls, osteoporosis, & maybe ruptures/fractures. The vitamin D stores lessen with age, particularly in wintertime. Scarcity of vitamin-D is among one of topmost commonly observed

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abnormality and an independent prognostic marker of HIV disease.

In the temperate regions for instance Edmonton and Boston, cutaneous creation of the vitamin D almost stops in the wintertime. Therefore, recognition, treatment & management of the scarcity of vitamin D is imperative for both, the musculo-skeletal health & extra-skeletal health, including cardiovascular and immune systems (1-3).

Deficiency of the Vitamin-D is common amongst HIV infected people all over the globe; having prevalence estimations ranging broadly from twenty-nine to eighty-seven percent (1). It has been related with quicker ailment progression, higher mortality as well as higher prevalence of diabetes (4). Literature showed that HIV +ve individuals were deficient for vitamin D as well. In two latest studies of the HIV infested subjects, less concentrations of vitamin D were linked with the raised cIMT (carotid intima-media thickness), the measure/meter of subclinical atherosclerosis(5,6).

Much morbidity related to a small amount of this vitamin has been stated to have a great prevalence among HIV-infested populace, especially concerning about bone diseases. Few researchers have described an incidence of osteoporosis & osteopenia more than among general populace matched for sex & age, & assessment of alteration of the metabolism of bone is a vital issue/ matter in the populace of HIV (7-8).

In latest years, astonishing rates/amounts of small serum levels of main circulating metabolite of the vitamin D (25-hydroxyvitamin D; 25(OH)D <30 ng/ml) have been recognized among the general populace. Scarcity of this vitamin has been linked with insulin resistance, CVD, osteoporosis, as well as all-cause death.

So regular screening for the low levels of 25(OH) D as well as supplementation of the insufficient individuals has been becoming more common. The safety of vitamin D supplementation at an extensive range of dosages has been revealed for majority of the people & Institute of the Medicine has validated the safety of the day-to-day oral dosages of this vitamin up to 2000-4000 IU (international units). (9)

There are many factors which are associated with HIV- infection that might have a contribution to lessened 25(OH) D levels, which comprise poor absorption, alimentary intake & little exposure to sun, abnormal activation of vitamin D owing to renal or hepatic impairment, altered storage in adipose tissue, and intrusion of the antiretroviral drugs with the

metabolism of this vitamin (10). One study in Belgium showed that 121 HIV positives checked for scarcity of vitamin-D and 107 of them had scarcity of vitamin-D (88.4%). (11)

Sufficiency of vitamin D is estimated/assessed by calculating/quantifying 25-hydroxyvitamin D (25[OH]D or calcidiol) amounts/levels. Based upon trials of vitamin-D supplementation (12-15) & the systematic review by IOM (Institute of the Medicine), some specialists, favor sustaining serum 25(OH)D amount b/w fifty-hundred nmol/L (20-40 ng/mL), while other specialists, are in favor of maintaining 25(OH)D amounts b/w seventy five- One hundred & twenty five nmol/L (30 -50 ng/mL).

Hence, range of mutual agreement is seventy-five to One hundred nmol/L (30-40 ng/mL). Specialists agree that amounts lesser than twenty ng/mL are considered as suboptimal for the skeletal health. In this study, we consider the vitamin-D level of ≤ 50 nmol/L to state/define dearth.

The IOM backs 25(OH)D amounts/levels beyond 50 nmol/L (20 ng/mL).(16) These suggestions are determined from the evidence which is related to the bone health. Some more specialists National Osteoporosis Foundation, Endocrine Society, IOF (International Osteoporosis Foundation), the American Geriatric Society [AGS]) recommend that least amount of 75 nmol/L (30 ng/mL) is essential in elder adults to lessen the risk of fracture and falls (17-21).

A systematic review done by IOM likewise decided there are deficient data to assess/ evaluate safe upper range of serum 25(OH)D. (16) Nevertheless, there were few concerns at serum 25(OH)D concentrations beyond 125 nmol/L (50 ng/mL). These concerns were mainly based upon/due to upsurge of fracture in those individuals treated with the higher-dose of vitamin D (16) & contradictory studies labeling a potential amplified danger for several cancers (eg, prostate pancreatic) and death with levels beyond 75 to 120 nmol/L (30 to 48 ng/mL).

HIV spreads primarily by un-protected sex (including oral & anal sex), hypodermic needles, contaminated blood transfusions, as well as from the mother to baby during delivery, pregnancy, or breastfeeding (22). Certain bodily fluids, for instance tears & saliva, do not transfer HIV (23). Methods of the prevention include needle exchange programs, safe sex, treating the infected individuals, and men's circumcision (24).

Objective of the investigation was to determine & assess frequency of deficiency of Vitamin D in HIV/AIDS patients.

Methodology

This descriptive cross-sectional study was directed at department of Medicine in Services Hospital Lahore. Study was conducted from June 22, 2017 to December 22, 2017. Sample size calculated was 160. 160 Patients with HIV confirmed by ELISA method were selected with 95% confidence level with margin of error of 5% & taking expected percentage Vitamin D deficiency i.e. 88.4% in HIV patients. Non-Probability Consecutive sampling technique was utilized

Inclusion criteria:

- Patients aged 25 to 65 of both genders (male or female) diagnosed as HIV/AIDS as per operational definition for more than 6 months.
- Patients presenting in outdoor, HIV clinic or admitted in Services Hospital Lahore.

Exclusion criteria:

- Patients who refuse to participate in the study.
- Patients having diabetes mellitus (BSR>200 mg/dl), chronic kidney disease (Cr>1.3 mg/dl), chronic liver disease (AST/ALT>40) and fractures.
- Patients on Vitamin D supplements will be excluded

Data Collection Procedure

160 patients fulfilling the inclusion criteria were tested. Every patient attending the outdoor patient department or admitted in the ward was included. After an informed consent vitamin D levels were performed on serum and a questionnaire was filled. Patients having vitamin D levels less than 20ng/ml (50nmol/l) were considered as having vitamin D deficiency as per operational definition. Treatment was provided to vitamin D deficit patients as per hospital protocol.

Data Analysis Procedure

Collected data were entered in SPSS v23.0 and analyzed for description and results. Variables like gender, SES and vitamin D deficiency were described as frequency and percentages. Age & duration of HIV were described as Mean± S.D. Data were stratified for gender, age, duration of HIV to see effect modifiers. Post stratification was done through Chi-Square Test keeping p-value≤ 0.05 as significant.

Results

In this study, 160 patients with HIV/AIDS were enrolled. Among these patients, 108(67.5%) were men, while 52(32.5%) were women. Age range was from 25 to 65 years with mean age of 43.5±12.2 years. Majority of patients 77(48.1%) were between 25 to 40 years of age. While 49(30.6%) and 34(21.3%) patients were between 41-55 and >55 years of age respectively. 61(38.1%) patients have low socioeconomic status, while 70(43.8%) and 29(18.1%) have middle and high socioeconomic status respectively. Table 1

Majority of the patients 74(46.25%) are having disease for 1-3 years. While 54(33.75%) and 32(20.0%) patients are having the disease for <1 and >3 years respectively. Figure 1

Mean Vitamin D level was 24.7±8.7, while mean duration of having HIV/AIDS was 3.65±1.68 years.

Overall frequency of deficiency of Vitamin D in individuals with AIDS/HIV was 111(69.4%), while 49(30.6%) were sufficient. Figure 2

Cross tabulation of gender, age, and duration of HIV/AIDS with Vitamin D deficiency was done.

By applying Chi-square, stratification of Vitamin-D scarcity with respect to the gender, it was concluded that, there is insignificant difference b/w Vitamin-D scarcity & gender (p>0.136). Table 2

By applying Chi-square, stratification of Vitamin-D scarcity relating to age, it was concluded that, there is insignificant difference b/w Vitamin-D deficiency & age (p>0.123). Table 3

By applying Chi-square, stratification of Vitamin D deficiency with respect to duration of HIV/AIDS, it was concluded that, there is insignificant difference b/w Vitamin-D deficiency & duration of HIV/AIDS (p>0.634). Table 4

Table 1. Socio-Demographic characteristics

Variable category	name with	Frequency	Percentage
Gender	Male	108	67.5
	Female	52	32.5
Age	25-40 years	77	48.1
	41-55 years	49	30.6
	> 55 years	34	21.3
Socio-economic status	<15,000 (Low)	61	38.1
	15,000-50,000 (Middle)	70	43.8
	>50,000 (High)	29	18.1

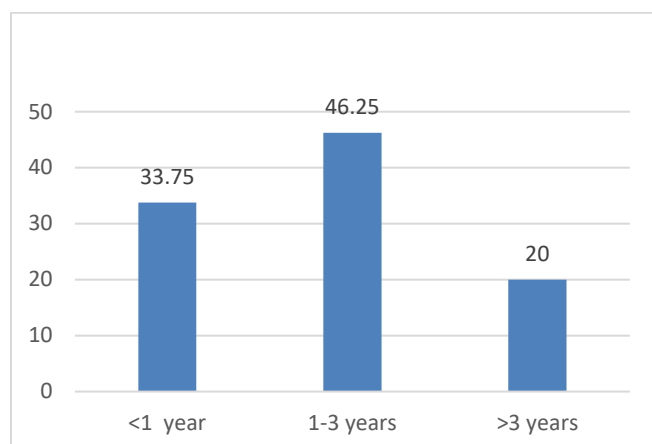


Figure 1. Distribution in percentage on the basis of Duration of HIV

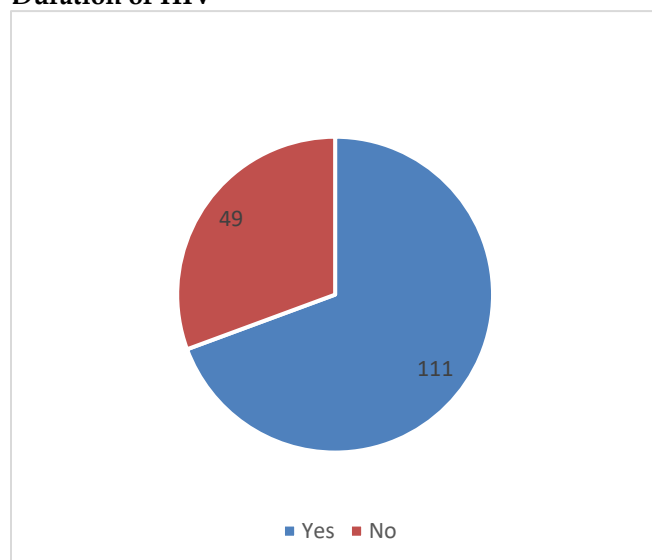


Figure 2. Frequency distribution of Vitamin D deficiency

Table 2. Stratification of Vitamin D deficiency with respect to Gender

Gender	Vitamin D deficiency		Total	p-value
	Yes	No		
Male	79	29	108	0.136
	73.1%	26.9%	100.0%	
Female	32	20	52	
	61.5%	38.5%	100.0%	
Total	111	49	160	
	69.4%	30.6%	100.0%	

Table 3. Stratification of Vitamin D deficiency with respect to Age

Age Groups	Vitamin D deficiency		Total	p-value
	Yes	No		
25-40	58	19	77	0.123
	75.3%	24.7%	100.0%	
41-55	34	15	49	
	69.4%	30.6%	100.0%	
>55	19	15	34	
	55.9%	44.1%	100.0%	
Total	111	49	160	
	69.4%	30.6%	100.0%	

Table 4. Stratification of Vitamin D deficiency with respect to Duration HIV/AIDS

Duration of HIV	Vitamin D deficiency		Total	p-value
	Yes	No		
<1 year	38	16	54	0.634
	70.4%	29.6%	100.0%	
1-3 years	53	21	74	
	71.6%	28.4%	100.0%	
>3 years	20	12	32	
	62.5%	37.5%	100.0%	
Total	111	49	160	
	69.4%	30.6%	100.0%	

Discussion

Here higher occurrence of deficiency of vitamin D has been found amongst diagnosed which, can't be attributed to effect of anti-retroviral agents. We used vitamin-D level of ≤ 50 nmol/L in our study to express dearth, optimum vitamin-D status has been reflected by the serum concentrations of 25-OHD of 75 nmol/l (30 μ g/l) & above (25, 26).

We saw 69.4% participants were scarce for Vitamin D. This is almost similar to the results of another study directed in South London which found that 67% were vitamin D deficient (< 50 nmol/L). (27)

Another investigation in South part of London U.K of 1077 HIV +ve individuals found 73.5% were deficient for vitamin D (< 50 nmol/L). (28) This (73.5%) is

consistent with the percentage reported in our study. In one another study 74% of infected individuals had insufficiency of this vitamin. This is almost in accordance to our findings (29). Similarly, various studies have conveyed higher rates of little levels of vitamin-D in HIV-infested populaces (30). Prevalence/occurrence of low Vit-D amongst HIV-infested individuals across different topographical areas, latitudes/ climates, & age groups varies from 24% to 72% (31). In another study, scarcity of this Vitamin was found in 60.2% of the partakers and serum mean of 25(OH)D came out to be 20.7 ng/mL (32).

A recent research investigating the levels of this vitamin in Swiss HIV +ve individuals found the positive association b/w time since the diagnosis of HIV and vitamin D on multivariable analysis. They wondered that this might be linked to the possible poorer health of newly diagnosed individuals (33). A study in Belgium showed that 121 HIV positives checked for the deficiency of vitamin D and 107 of them had the deficiency of vitamin D (88.4%).(11)

In one study, greater prevalence of insufficiency of this vitamin was found in non-white racial crowds & an association in spring and wintertime months (34). There were no further demographic features, which recognized folks at greater risk.

One of most communal comorbidities in the HIV-1 patients is the insufficiency of Vitamin-D (Vit D). Considering the probable part of the vitamin D in several chronic ailments, the scientific groups emphasizes on the likely impact of its dearth on HIV infested populace. Observed racial inequality in the status of vitamin D has created a usual impression that nutritional vitamin D requirements/necessities are higher when compared with native non-black white populaces. Vitamin D also has a role in slowing down HIV ailment progression & averting mortality due to its widespread involvement/contribution in the entire immune system, even among those initiating antiretroviral therapy (ART). (35-39)

Majority of the patients 74(46.25%) of our study are having disease for 1-3 years. While 54(33.75%) and 32(20.0%) patients are having the disease for <1 and >3 years respectively. While in the study of Canuto JM et al majority (63.2%) subjects reported the duration of more than 5 years since diagnosis (40).

In this study, Chi-square test reveals that there was insignificant statistical difference found between Vitamin-D deficiency & gender ($p>0.136$). This is

contrary to the results stated by Chaudhary B, where significant difference was detected on gender stratification for women population ($P<0.05$). (41) While the outcomes of study of Musarurwa C et al look like our study as he also reported statistically insignificant value ($p\text{-value}= 0.893$) (42)

HIV infection & ART (antiretroviral therapy) might generate risk factors for the insufficiency of vitamin D, including variations of vitamin-D metabolism by ART (43).

In this study, Chi-square test reveals that there was insignificant statistical difference found between Vitamin-D deficiency & age ($p>0.123$). While Aftab S et al reported statistically significant value ($p\text{-value}= 0.000$) for dearth of Vitamin D & age in his research. In this investigation, no significant difference b/w Vitamin D deficiency & duration of HIV/AIDS was found ($p>0.634$). While Aftab S et al reported statistically significant value ($p\text{-value}= 0.033$) for scarcity of vitamin-D & duration of disease in his study (44).

Limitations

Limitations of this study were; Sample size was small. Among biochemical variables, most of our patients with hypocalcaemia were vitamin D deficient; but a significant association was not observed probably due to relatively small numbers. Other markers of bone metabolism (phosphate, alkaline phosphatase) were not associated with vitamin D deficiency as it was difficult to measure other parameters/markers in one study. Old age and postmenopausal females were not scanned in this study. Complications of Vitamin D deficiency in HIV patients were not observed. Vit-D levels were not determined before the diagnosis of HIV.

Conclusion

The frequency of vitamin D scarcity/deficiency is very high among HIV/AIDS patients. Therefore, this recommends that all HIV +ve persons should be well-thought-out for screening routinely. All the required investigations should be carried out timely. HIV viral load, CD4 count, & HIV clinical staging/grading don't help to recognize those at danger, but short serum calcium would prompt investigation of 25-OHD levels.

Recommendations

Screening should be done on routine basis. Vitamin D supplements should be prescribed. Future studies

must determine appropriate threshold for the 25(OH)D across different populations. Efforts must be made to educate the patients on the value of dietary vitamin D. Educate the patients about the role of sun exposure regarding vitamin-D. Strategies necessitating the health education of populace, mandatory food fortification as well as vitamin-D supplementation programs need to be formulated on national level.

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