

Impact of Socioeconomic Status and Duration of HIV/AIDS on Scarcity of Vitamin-D among HIV Infected 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 topmost commonly observed abnormality and an independent prognostic marker of HIV disease. 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 and 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 and Chi square test was applied.

Results: Out of 160, 108(67.5%) were males, while 52(32.5%) were ladies. Frequency of Vitamin D deficiency was 111(69.4%). Results demonstrated that 61(38.1%) individuals had low socio-economic status, while 70(43.8%) and 29(18.1%) belonged to middle and high socio-economic status respectively. There were no significant differences between Vitamin D deficiency with socioeconomic status (p-value 0.060).

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

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Introduction

Vitamin-D scarcity/Deficiency is characterized by the hypophosphatemia or/and hypocalcemia along with rickets and osteomalacia in kids and in grown-ups respectively, which is now-a-days rare in developed nations. Deficiency of a Vitamin D is communal amongst HIV-infected folks globally; having prevalence estimations from twenty-nine to eighty seven per cent. Vitamin-D Scarcity is amongst one of the topmost usually observed abnormality and is also an independent prognostic marker of the HIV disease.

Recognition, treatment plus management of scarcity of vitamin-D is vital for both, the extra-skeletal health and musculo-skeletal health, including cardio-vascular and immune systems (1-3).

Much illness related to lesser amount of said vitamin has been indicated to have great occurrence amongst HIV-infested masses, especially concerning about the bone ailments (4). Few researchers have indicated an incidence of an osteoporosis & an osteopenia more than amongst

general public matched for age, gender, & assessment of an alteration of metabolism of the bone is a vital issue in masses of HIV (5-6).

Literature disclosed that HIV +ve folks were deficient for this vitamin as well. In 2 latest researches of HIV-infested subjects, less concentrations/amount of vitamin-D were linked with raised/higher cIMT (carotid intima-media thickness), a measure/meter of sub-clinical atherosclerosis (7, 8).

In recent years, astounding rates/amounts of the small serum levels of main-circulating metabolite of a vitamin D (25-hydroxyvitamin D; 25(OH)D <30 ng/ml) have been identified among general public. Dearth of said vitamin has been related with an insulin resistance, osteoporosis, CVD, along with all-cause demise.

Several factors are related with the infection of HIV that could have a role to reduce 25(OH) D levels (9). So regular screening for low levels of 25(OH) D along with supplementation of insufficient folks have been becoming common. Institute of Medicine has confirmed the safety of a day-to-day oral dosage of this vitamin up-to 2000-4000

international units. (10). One research revealed that 107 out of 121 HIV +ve patients were deficient of vitamin-D as well (88.4%). (11)

Socioeconomic status (SES) includes not just wage but also educational accomplishment, financial security, subjective perceptions of the social status and social class. Poverty, specifically, isn't a single factor rather it is characterized by the multiple psychosocial and physical stressors. SES is a steady and reliable predictor of vast array of the outcomes across the lifespan, including psychological and physical health. Both internationally and domestically, HIV is an ailment that is surrounded by economic and social inequity, as it affects folks of lower socio-economic status. Research revealed that individual's socio-economic standing may affect her or his likelihood of getting infected with HIV. Moreover, SES is also a key factor in determining one's quality of life after he/she is affected by this virus (12).

Similarly, socioeconomic status is also among one of strongest predictors of vitamin-D deficiency. Income level of family plays an important part in vitamin-D scarcity. Low-income families are unable to access the fortified foods and also vitamin-D dietary supplements, thus, are more probable to have vitamin-D scarcity than those good-income families (13). According to a recent research, lower SES was also associated with greater risk of vitamin-D insufficiency among women of China (14). Sufficiency of vitamin-D is estimated/measured by calculating 25-hydroxyvitamin-D (25[OH] D or calcidiol) levels/amounts. Based upon systematic review of IOM (Institute of Medicine) & various trials of vitamin D supplementation (15-16), some consultants, favor sustaining a serum 25(OH)D level b/w 50-100 nmol/L (20 to 40 ng/mL), however other specialists, are in the favor of maintaining 25(OH)D amounts b/w 75- 125 nmol/L (30 to 50 ng/mL).

Henceforth, range of joint agreement is 75-100 nmol/L (30-40 ng/mL). Consultants decide that levels lesser than 20 ng/mL are thought as sub-optimal for skeletal health. In this research, we consider vitamin D level of ≤ 50 nmol/L to define/state dearth.

IOM backs 25(OH) D amounts/levels beyond 50 nmol/L (20 ng/mL) (17). These commendations are determined from an evidence which is correlated to bone health. Some other consultants National Osteoporosis Foundation, IOF (International Osteoporosis Foundation), Endocrine Society, An American Geriatric Society [AGS]) endorse that minimum 75 nmol/L (30 ng/mL) level is essential in old-aged people to reduce the risk /chance of fracture & falls (18-19).

Objective of this research was to evaluate an impact of socio-economic status on scarcity of Vitamin-D among HIV infected patients.

Methodology

This cross-sectional study was carried out at the department of Medicine of Services Hospital Lahore from 22 June 2017 to 22 December 2017. Sample size came out to be 160. 160 Patients of HIV confirmed by the ELISA method were taken, at confidence level of 95% with margin of error 5% & taking expected percentage/frequency of Vitamin-D scarcity i.e. 83.7% (20) in HIV-patients. Non-Probability consecutive sampling technique was applied

Inclusion criteria:

- Patients aged 25-65 years of both genders (female or male) diagnosed as HIV/AIDS according to operational definition for more than six months.
- Patients approaching HIV clinic, an outdoor department or admitted in the services Hospital Lahore.

Exclusion criteria:

- Individuals who denied to participate in this study.
- Patients having chronic kidney ailment (Cr>1.3 mg/dl), diabetes mellitus (BSR>200 mg/dl), fractures and chronic liver disease (AST/ALT>40).
- Patients on Vitamin-D supplements

Informed consent from those patients fulfilling our inclusion criteria were taken and their vitamin-D levels were performed on a serum and then questionnaire was filled. Individuals having vitamin-D levels < 50nmol/l (20ng/ml) were considered as vitamin-D deficient as per an operational definition. Treatment of vitamin-D deficit individuals was done as per the hospital protocol.

Participants were categorized on basis of socio-economic status as; Low, Middle/Average and High class 13.

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. Data was stratified for age, gender, and socio-economic status. Post stratification was done through Chi-Square Test keeping p-values ≤ 0.05 as significant.

Results

In this study, one hundred and sixty HIV/AIDS patients were enrolled. Among whom, 108(67.5%) were males, while 52(32.5%) were ladies. Patients were 25-65 years old, with mean age 43.5 ± 12.2 years. Majority of the participants 77(48.1%) were between 25-40 years of age. Whereas 49(30.6%) and 34(21.3%) individuals were between 41-55 and >55 years of age respectively. 61(38.1%) individuals' low socio-economic status, while 70(43.8%) and 29(18.1%) belonged to middle & high socio-economic status respectively. Table 1

Mean Vitamin-D level was 24.7 ± 8.7 , whereas mean duration/time since HIV/AIDS 3.65 ± 1.68 years. 111(69.4%) participants reported the scarcity of Vitamin-D while 49(30.6%) were Vitamin D sufficient.

By applying a Chi-square, stratification of a Vitamin-D deficiency with respect to Socio-economic status, it was noticed that, there is insignificant difference b/w Vitamin-D deficiency & Socio-economic status ($p=0.060$). Table 2

Table 1: Socio-Demographic characteristics

Variable name with category		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 Pakistani rupee (Low)	61	38.1
	15,000-50,000 Pakistani rupee (Middle/Average)	70	43.8
	>50,000 Pakistani rupee (High)	29	18.1

Table 2: Stratification of Vitamin D deficiency with respect to Socio-economic status

Socio-economic status	Vitamin D deficiency		Total	p-value
	Yes	No		
<15,000 (Low)	43	18	61	0.060
	70.5%	29.5%	100.0%	
15,000-50,000 (Middle/Average)	53	17	70	
	75.7%	24.3%	100.0%	
>50,000 (High)	15	14	29	
	51.7%	48.3%	100.0%	
Total	111	49	160	
	69.4%	30.6%	100.0%	

Discussion

Vitamin-D has also a role/part in decelerating the progression of HIV-ailment & averting demise because of its widespread involvement/contribution in an entire immune system, even amongst those initiating anti-retroviral therapy (ART). Here we used $\leq 50\text{nmol/L}$ level of vitamin D in our research to express dearth/scarcity, optimum vitamin D status has been reflected by serum concentrations of 25-OHD of 75 nmol/l ($30\text{ }\mu\text{g/l}$) and above (21, 22).

In this study 69.4% partakers were scarce for Vitamin-D. Another research in Southern part of London on 1077 HIV +ve patients found 73.5% were scarce for vitamin D ($<50\text{nmol/L}$), which is consistent with percentage told in our study (23). These results are in agreement to outcomes of another study where 67% individuals were deficient for vitamin-D ($<50\text{nmol/L}$). (24)

80% of infected patients of another study had inadequacy of vitamin D, which is also in accordance to our outcomes (25). Frequency of little Vit-D in HIV-infested folks across different topo-graphical regions, age groups & climates, varies from twenty four to seventy two percent (26). In another investigation, scarcity of said vitamin was seen in 60.2% subjects and 20.7 ng/mL serum mean for 25(OH) D (27). Other than Vitamin-D, lack of phosphorous and calcium intake may also lead to pathological condition (28). A study conducted in Belgium revealed that 107 (88.4%) out of 121 HIV-positives had a deficiency of vitamin-D too (11). In another study, greater frequency of inadequacy of said vitamin was noticed in non-white ethnic populace & an association during spring and winter times (29).

Lower SES may have an impact on vit-D status as it has been linked with factors e.g. reduced outdoor exposure and physical activity, which may lower an UVB exposure, reduced supplemental and dietary vit-D intake (30). Population of dis-advantaged regions were more than two times likely to be Vit-D deficient as compared to affluent population (31).

In our study, Chi-square test showed that there was an insignificant statistical difference between Vitamin D deficiency & socio-economic status ($p=0.060$), which is similar to that reported by Zhang et al where there was also an insignificant statistical difference between Vitamin D

deficiency & socio-economic status (32). This is also in accordance with outcomes of other study where Low socio economic status independently enhanced the risk of severe dearth of Vitamin-D (33). Linhares et al, in another study, didn't report significant difference in mean Vitamin-D concentration among different socio-economic groups (34). When comparing below & above average SES in another research, no difference in prevalence of vit D deficiency was noticed ($P = 0.866$). (30)

Limitations of study were; Small sample size. Other parameters /markers for bone metabolism (alkaline phosphatase and phosphate) were not related with scarcity of vitamin-D as it was tough to measure other markers/indicators in one study. Post-menopausal and old aged women were not scanned. Complications of scarcity of vitamin D in HIV-individuals were not observed. Prior to diagnosis of HIV, vit-D levels were not determined.

Conclusion

Frequency of dearth of vitamin-D was not significantly related to socio-economic status and duration of HIV/AIDS, however, it was very high amongst infected patients. Hence, this commends that all HIV +ve individuals should be routinely considered for screening. All required investigations must be accomplished timely. HIV-viral load, CD4 count, & clinical staging/grading of HIV don't help to detect those at danger, however, short serum-calcium would swift investigation of the 25-OHD levels.

Screening must be done on routinely basis. Vitamin-D supplements should also be prescribed. Future researches must determine and decide an appropriate threshold for a 25(OH) D across various populations. Efforts must also be made to teach and educate the patients about role of exposure to sun concerning vitamin-D and also on value of dietary vitamin-D. Strategies and policies necessitating health education of the public, mandatory food fortification & supplementation programs should be formulated on the national level. Further larger researches are needed to assess and evaluate an impact of socioeconomic status and duration of HIV/AIDS on scarcity of Vitamin-D.

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