

# Clinical Profile and Management Modalities of Vitamin D Deficiency and Insufficiency Among Adult's Cohorts at Primary Health Care Facilities

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## Abstract

This study is aiming assess the prevalence of Vit D Insufficiency and Deficiency among Adult cohort in Dubai, To study the epidemiological profile and associated factors, study methodology was a cross sectional study carried out on ( 80 ) Adult patient, age rage( 15-70 y ) randomly selected from Vitamin deficiency and insufficiency cohorts registered and attending primary health care facilities at Dubai health authority, full social- demographic and clinical data has been collected through data collection interview questionnaire, patients follow up has been extended for up to one year in relation to lab investigation follow up, vitamin D therapy, health education, life style intervention and physical examination ( operational definitions of variables, inclusion-exclusion criteria, scale of measurement and ethical considerations has been addressed properly throughout the research course. The result showed by the study revealed that 8.75% of Vitamin D Deficiency and 2.5% of vitamin D insufficiency cohort shown an association with chronic illness, 37.75% deficiency and 13.75% insufficiency showed associated with the cohort life style (lack of Direct Exposure to sun), 35% of Vitamin deficiency and 15% with vitamin insufficiency showed association with quality of dietary intake. The study revealed that 5% of the adults with vitamin deficiency where having hypertension, 2.5% diabetes, 2.5% dyslipidemia, 2.5% hypothyroidism ad 2.5% with asthma, while Vitamin D insufficiency associated with hypertension 8.75%, diabetes 5%, dyslipidemia 6.25%, hypothyroidism 5% and asthma 3.75%). About 30% of total abnormal serum vitamin D were deficiency <10 and 70% were shown insufficiency 10-30 32.5% of abnormal serum vitamin D were male and 67.5% were females. vitamin D deficiency and insufficiency studied sample about 30% given Vitamin D supplement 5000 IU week for three month cycle to be re evaluated again and 70% were given 100 IU vitamin D supplement daily for three month cycle to be re evaluated again by serum vitamin D level). The study reflect that in the clinical assessment and follow up protocol applied about 30% of the total sample were investigated with serum calcium, yet 70% serum calcium were not carried out for them and only 27.5% of the total number of patient enrolled in the study were followed up with repeated serum vitamin d after each treatment cycle, while 74.5% were not considered for serum vitamin d monitoring.

## Keywords

Clinical, Management, Vitamin D, PHC

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## 1. Introduction

Vitamin D deficiency is the most common nutritional deficiency worldwide in both children and adults. In the US and Europe, >40% of the adult population >50 years of age is

vitamin D-deficient, increases the risk of many chronic diseases, including cancer, autoimmune diseases, type 2 diabetes, heart disease and hypertension, and infectious

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diseases (including upper respiratory tract infections and tuberculosis), as well as osteoarthritis. Vitamin D deficiency, which classically manifests as bone disease (either rickets or osteomalacia), is characterized by impaired bone mineralization. More recently, the term *vitamin D insufficiency* has been used to describe low levels of serum 25-hydroxyvitamin D that may be associated with other disease outcomes. Vitamin D deficiency results in abnormalities in bone metabolism [1, 2] and in calcium and phosphorus homeostasis [3, 4] and is increasingly recognized as a key factor in many chronic diseases [5, 6]. Bone pain due to osteomalacia primarily affects the bones between the joints, whereas arthritis usually causes predominantly joint pain, and fibromyalgia causes more diffuse muscle and soft tissue pain; however, it can be difficult to distinguish between these disorders. Proximal muscle weakness and gait instability are often present. Because the growth plates have closed in adults, the radiographic features differ from those typical of rickets. Radiography may reveal pseudo fractures of the pelvis, femurs, metatarsals, or lateral margins of the scapulae [7]. Evidence of a positive association between BMD and serum 25(OH)D concentrations in adolescents is fair, but the evidence for a positive association in infants is inconsistent. [8, 9] Serum 25(OH)D concentration was related to hip BMD in community-dwelling women and men aged at least 20 years who participated in the US NHANES III survey. [10] Higher calcium intake was significantly associated with higher BMD only for women with 25(OH) D values less than 20 ng/mL. One of the limitations of a cross-sectional study like the NHANES survey is that it can demonstrate only associations, not cause-and-effect relationships. Another confounding factor may be associated with low vitamin D intake and low bone density. For example, healthier people who exercise more outside in the sun may have greater bone density because of their exercise and higher 25(OH)D levels because of sun exposure. In a prospective observational study of adults older than 65 years participating in NHANES III, the risk of death was 45% lower in those with 25(OH)D values greater than 40 ng/mL compared with those with values less than 10 ng/mL (hazard ratio [HR], 0.55; 95% CI, 0.34-0.88). [11] The observational Nurses' Health Study found that vitamin D supplementation and calcium supplementation were both associated with a reduction in risk of type 2 diabetes. [12] Several lines of evidence demonstrate the effects of vitamin D on proinflammatory cytokines, regulatory T cells, and immune responses, with conflicting interpretation of the effects of vitamin D on allergic diseases. [13, 14, 15, 16].

## 2. Objective

To study the prevalence of Vit D Insufficiency and

Deficiency among Adult cohort in Dubai, To study the epidemiological profile and associated factors.

## 3. Methodology

A cross sectional study carried out on ( 80 ) Adult patient, age range( 15-70 y ) randomly selected from Vitamin deficiency and insufficiency cohorts registered and attending primary health care facilities at Dubai health authority, full socioe demographic and clinical data has been collected through data collection interview questionnaire, patients follow up has been extended for up to one year in relation to lab investigation follow up, vitamin D therapy, health education, life style intervention and physical examination (operational definitions of variables, inclusion-exclusion criteria, scale of measurement and ethical considerations has been addressed properly throughout the research course:

## 4. Results

The study revealed that 8.75% of Vitamin D Deficiency and 2.5% of vitamin D insufficiency cohort shown an association with chronic illness, 37.75% deficiency and 13.75% insufficiency showed associated with the cohort life style (lack of Direct Exposure to sun), 35% of Vitamin deficiency and 15% with vitamin insufficiency showed association with quality of dietary intake as reflected by table 1. The study revealed that 5% of the adults with vitamin deficiency where having hypertension, 2.5% diabetes, 2.5% dyslipidemia, 2.5% hypothyroidism ad 2.5% with asthma, while Vitamin D insufficiency associated with hypertension 8.75%, diabetes 5%, dyslipidemia 6.25%, hypothyroidism 5% and asthma 3.75% as in table 2. About30 % of total abnormal serum vitamin D were deficiency <10 and 70% were shown insufficiency 10-30 32.5% of abnormal serum vitamin D were male and 67.5% were females. As in table 3. Among the total vitamin D deficiency and insufficiency studied sample about 30% given Vitamin D supplement 5000 IU week for three month cycle to be re evaluated again and 70% were given 100 IU vitamin D supplement daily for three month cycle to be re evaluated again by serum vitamin D level as shown in table 4. The study reflect that in the clinical assessment and follow up protocol applied about 30% of the total sample were investigated with serum calcium, yet 70% serum calcium were not carried out for them as in table 5 and only 27.5% of the total number of patient enrolled in the study were followed up with repeated serum vitamin d after each treatment cycle, while 74.5% were not considered for serum vitamin d monitoring as per table 6.

**Table 1.** Frequency distribution of Vitamin D deficiency patients according possible cause.

Category	Vitamin D Deficiency		Vitamin D Insufficiency	
	No	%	No	%
Life style dietary	30	37.75%	11	13.75%
Chronic illness mixed	7	8.75%	2	2.5%
total	65	81.25%	15	18.75%

**Table 2.** Distribution of Vitamin deficiency patients according to co-morbidity.

Category	Vitamin D Deficiency		Vitamin D Insufficiency	
	No	%	No	%
No comorbidity	13	16.2	40	50%
hypertension	4	5.0%	7	8.75%
Diabetes	2	2.5%	4	5.0%
Dyslipidemia	2	2.5%	5	6.25%
hypothyroidism	2	2.5%	4	5.0%
Asthma	2	2.5%	3	3.75%
Total	23	28.75%	57	71.25%

**Table 3.** Distribution of Vit D Deficiency patients according to the Vit D blood level at the time of Diagnosis.

Category	10-30 Insufficiency		<10 Deficiency	
	No	%	No	%
Male	17	21.25%	9	11.25%
Female	39	48.75%	15	18.75%
Total	56	70%	24	30%

**Table 4.** Frequency distribution of Vit D Deficiency according to type of treatment received.

Category	Weekly vit d 50000		Daily vit D 1000	
	No	%	No	%
Male	6	7.5%	18	22.5%
Female	18	22.5%	38	47.5%
Total	24	30.0%	56	70.0%

**Table 5.** Frequency distribution of Vit D Deficiency according to S.calcium.

Category	S. calcium done		S. calcium not done	
	No	%	No	%
Male	7	8.75%	18	22.5%
Female	17	21,25%	38	47.5%
Total	24	30.0%	56	70.0%

**Table 6.** Frequency distribution of Vit D Deficiency according to repeated Vit.D level.

Category	repeated Vit.D done		repeated Vit.D not done	
	No	%	No	%
Male	7	8.7%	17	21.25%
Female	15	18.75%	41	51.25%
Total	22	27.5%	58	75.5%

## 5. Discussions

As the current study showed that about half of the Vitamin d Deficiency and insufficiency associated with dietary intake quality and profile, this will raise the issue of adding fortified vitamin d to the food as similar to what has been applied in other

countries Despite predominantly non-vegetarian dietary pattern, approximately 60% of the intake of vitamin D from food comes from fortified foods in USA [17] and Canada [18]. In USA, vitamin D fortification of foods is voluntary, but it is strictly regulated pertaining categories of foods, functional use and level of use, thus limiting over-fortification.

This study showed an association of chronic low serum vitamin D with other co morbidities like cardiovascular diseases similar to other studies suggesting that CVDs are associated with vitamin D deficiency [19, 20]. Increased risk of hypertension was associated with living at higher latitudes [21]. 25(OH)D level < 21 ng/mL was associated with increased risk of hypertension, diabetes, obesity and high triglyceride levels—all associated with increased cardiovascular mortality [22]. Various studies have reported reduced 25(OH) D concentrations in patients with previous and prevalent cardiovascular or cerebrovascular diseases [23]. As for other co morbidities, the present study showed association with diabetes, dyslipidemia which come in similar to other studies that showed Hyperinsulinemia is associated with hypertension, obesity, dyslipidemia, and glucose intolerance [324]. These conditions are collectively known as “metabolic syndrome” [25]. A meta-analysis of observational studies showed inverse relation of 25(OH)D levels and calcium status with insulin resistance and hyperglycemia. In this meta-analysis, supplementation with both the nutrients combined showed benefit in optimizing glucose levels [26]

## 6. Conclusions

Clinical management and follow up for vitamin deficiency and insufficiency were recognized as major pitfall, clinical vitamin D management and follow up guideline noticed to be remarkably in adequate. Population based intervention program might be of great help if put in place

## Recommendations

Developing and applying national vitamin D deficiency management Guideline and standards based on international best practice is a necessity along with increasing health care professional management capacity

## Ethical Issues

Ethical consideration applied as per standards and regulations.

## Conflict of Interest

All the authors do not have any possible conflicts of interest.

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