PREVALENCE OF SERUM VITAMIN D DEFICIENCY IN PATIENTS OF CHRONIC FATIGUE WITHOUT ANY OTHER SYSTEMIC ILLNESS

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ABSTRACT

Introduction: Vitamin D deficiency is associated with various types of disorders such as musculoskeletal disorder (rickets, osteomalacia, osteoporosis, myopathy), autoimmune disorders cardiovascular disorders (hypertension, congestive heart failure, myocardial infarction), kidney disorders, carcinoma), psychiatric disorders (depression, schizophrenia), skin disorders.

Objectives: To Determine prevalence of serum Vitamin D deficiency in patients of chronic fatigue without any other systemic illness.

Study design: Cross sectional study

Setting: Department of Medicine, Central Park Teaching Hospital, Lahore

Subjects: Total 150 patients with age 15-60 years of age of either gender having chronic Fatigue/ tiredness, generalized pains from more than 6 Months were enrolled.

Methods: Study was conducted from 26th Jan 2020 till 25th Dec 2020 after approval of hospital ethical committee and written informed consent of patients. Serum vitamin D level performed to assess vitamin D level. Vitamin D deficiency was noted Proforma was filled after vitamin D level obtained. Data was entered and analyzed using SPS20.

Results: In our sampled population total 150 patients were enrolled with mean age of 35.3±12.8 years. Most of patients belonged to elder age group i.e. 55.3%. There were 67.3% males and 32.7% females. Mean weight of sampled population was 70.9±11.7 kg, mean height was 156.8±15.1 cm and mean BMI was 28.7±5.9 kg/m2. Mean vitamin D levels was 39.16±11.2 ng/dl. Vitamin D deficiency was present in 64.7% patients.

Conclusion: Vitamin D deficiency is common in patients with chronic fatigue.

Keywords: Vitamin D, Chronic fatigue, Deficiency

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INTRODUCTION

Vitamin D is also known as calcidiol or 25(OH) D. It is a fat-soluble vitamin obtained from sun exposure, food, and supplements. It is a necessary vitamin for calcium absorption, maintaining serum calcium and phosphate concentrations to enable normal mineralization of bone. Serum levels less than 20 ng/mL are considered deficient. [1-2]

Vitamin D deficiency constitutes a largely unrecognized epidemic in many populations worldwide. A total of 40–100% US and European elderly men and women may have vitamin D deficiency [2]. Vitamin D deficiency is associated with various types of disorders such as musculoskeletal disorder (rickets, osteomalacia, osteoporosis, myopathy), autoimmune disorders (diabetes mellitus, multiple sclerosis, osteoarthritis, rheumatoid arthritis, Crohn's disease, etc), cardiovascular disorders (hypertension, congestive heart failure, myocardial infarction), kidney disorders,), carcinoma (at least 17 carcinomas, such as carcinoma of the breast, prostate, colon, ovary, pancreas, etc),psychiatric disorders (depression, schizophrenia), skin disorders (psoriasis), etc[3-5].

Vitamin D deficiency is still under-diagnosed. In USA 33% patients present with the complain of chronic fatigue and out of which 77.2% patients are Vitamin D deficient.[6] In Holick MF[7] study almost 30% of patients present as proximal muscle weakness and pain before the biochemical signs of vitamin D deficiency appear leading to unnecessary investigative work up and in local studies conducted in Northern Pakistan almost 73.2% patients are Vitamin D deficient[8].In another study which conducted in Karachi almost 66.1% adults have Vitamin D deficiency.[9] So in at-risk individuals it should be kept as one of the differential diagnosis for muscle weakness and chronic pains as the condition is reversible and easily treated with vitamin D and calcium supplementation.[10]. Main contributing factors which cause Vitamin D deficiency are inadequate food intake, inadequate and avoidance of sun exposure, consumption of chapattis (Wheat bread) which is high in phytates which bind calcium in the gut and interfere with calcium absorption. These all factors cause high prevalence of vitamin D deficiency in house bound and elderly patients leading to chronic pains. [11-12]

The rationale of this study is to determine the prevalence of Vitamin D deficiency among patients with chronic fatigue, which affecting patients' quality of life by affecting their working abilities, tiredness, chronic pains, and in females who unable to perform house hold work leading to financial burden for both patients and their families by irrelevant investigations and in males who frequently remains absent from professional work due to fatigue and pains.

METHOD:

Study Design: Cross-Sectional Study

Setting: Study was conducted in the Medical Out Patient Department of Teaching Hospital, Lahore.

Study Period: 26th Jan 2020 till 25th Dec 2020.

Sampling Technique: Non-probability, consecutive sampling.

Sample Size: A Sample of 150 cases was selected for the study. It was calculated with 95% confidence level and 7% margin of error and taking expected percentage of Vitamin D deficiency in chronic fatigue as 77%.

$n = z1-\alpha 2/(1-P)d2$

α= level of significance = 95%

P expected percentage of vitamin D deficiency in chronic fatigue patients = 77%.

d2 = margin of error = 7%

Sample Selection:

Inclusion Criteria:

- Patients with age 15-60 years of age of either gender
- Chronic Fatigue/ tiredness, generalized pains from more than 6 Months.

Exclusion Criteria:

- Patients with any co morbidity i.e. Hypertension (BP >160/90mmHg), Diabetes (BSR >200mg/dl), Chronic kidney disease(S/Cr >1.3mg/dl), Congestive cardiac failure, Ischaemic heart disease, Chronic obstructive pulmonary disease, Chronic liver disease (AST/ALT >40IU/L), Tuberculosis and any Malignancy.
- Already on Vitamin D supplementations.
- Known hyperparathyroidism.

- Known case of Rickets or Osteomalacia.

DATA COLLECTION PROCEDURE:
Study was conducted after approval of hospital ethical committee. All Data from 150 patients fulfilling inclusion and exclusion criteria was included in study, after taking informed written consent. Demographic information (age, gender, and occupation), detailed history and thorough physical examination was done. Serum vitamin D level performed to assess vitamin D level. Proforma was filled after vitamin D level obtained. Vitamin D deficiency was labelled as per operational definition. (Annex 1).

DATA ANALYSIS PROCEDURE:
Data was entered and analyzed using SPSS version 20. Qualitative data like gender and vitamin D deficiency is presented in the form of frequency. Quantitative data like age and serum 25(OH)D levels are presented in the form of the mean±SD. Data is stratified for age, gender, BMI, physical activity, sun exposure and milk intake. Post stratification test is applied and p- value≤ is taken significant.

RESULTS
In our sampled population total 150 patients were enrolled with mean age of 35.3±12.8 years. Table 1
Most of patients belonged to elder age group i.e. 55.3%. Table 2
There were 67.3% males and 32.7% females. Table 3
Mean weight of sampled population was 70.9±11.7 kg, mean height was 156.8±15.1 cm and mean BMI was 28.7±5.9 kg/m2. Table 4
Mean vitamin D levels was 39.16±11.2 ng/dl. Table 5
Vitamin D deficiency was present in 64.7% patients. Table 6
There was no effect of age on frequency of vitamin D deficiency, p-value 0.911. Table 7
There was no effect of gender on frequency of vitamin D deficiency, p-value 0.115. Table 8
There was no effect of BMI on frequency of vitamin D deficiency, p-value 0.632. Table 9
Decrease sun exposure was associated with increased frequency of vitamin D deficiency, p-value <0.001. Table 10
Decrease milk intake was associated with increased frequency of vitamin D deficiency, p-value 0.021. Table 11
Reduced physical activity was associated with increased frequency of vitamin D deficiency, p-value 0.022. Table 12
Table 1: Age of sampled population

	N	Minimum	Maximum	Mean	Std. Deviation
Age (Years)	150	15	60	35.36	12.824

Table 1: Age of sampled population

Table 2: Age distribution of sampled population

		Frequency	Percent
Age groups	18-30 years	67	44.7
	31-60 years	83	55.3
	Total	150	100.0

Figure 6: Age distribution of sampled population

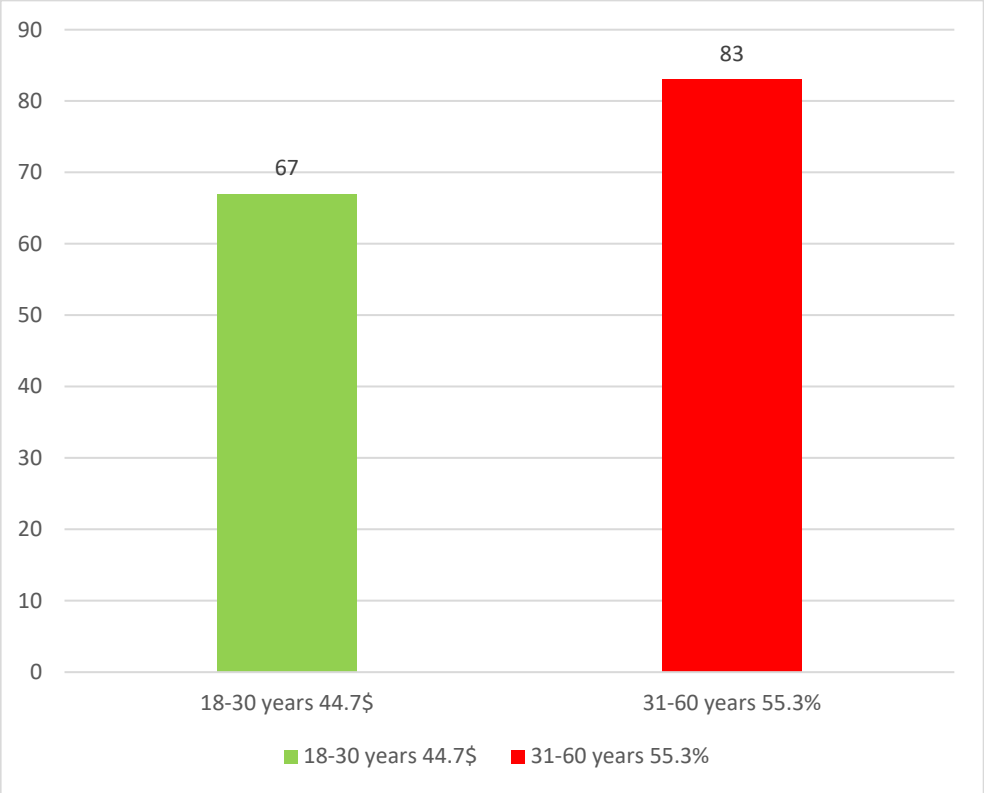

Table 3: Frequency of gender

		Frequency	Percent
Gender	Male	101	67.3
	Female	49	32.7
	Total	150	100.0

Figure 7: Frequency of gender

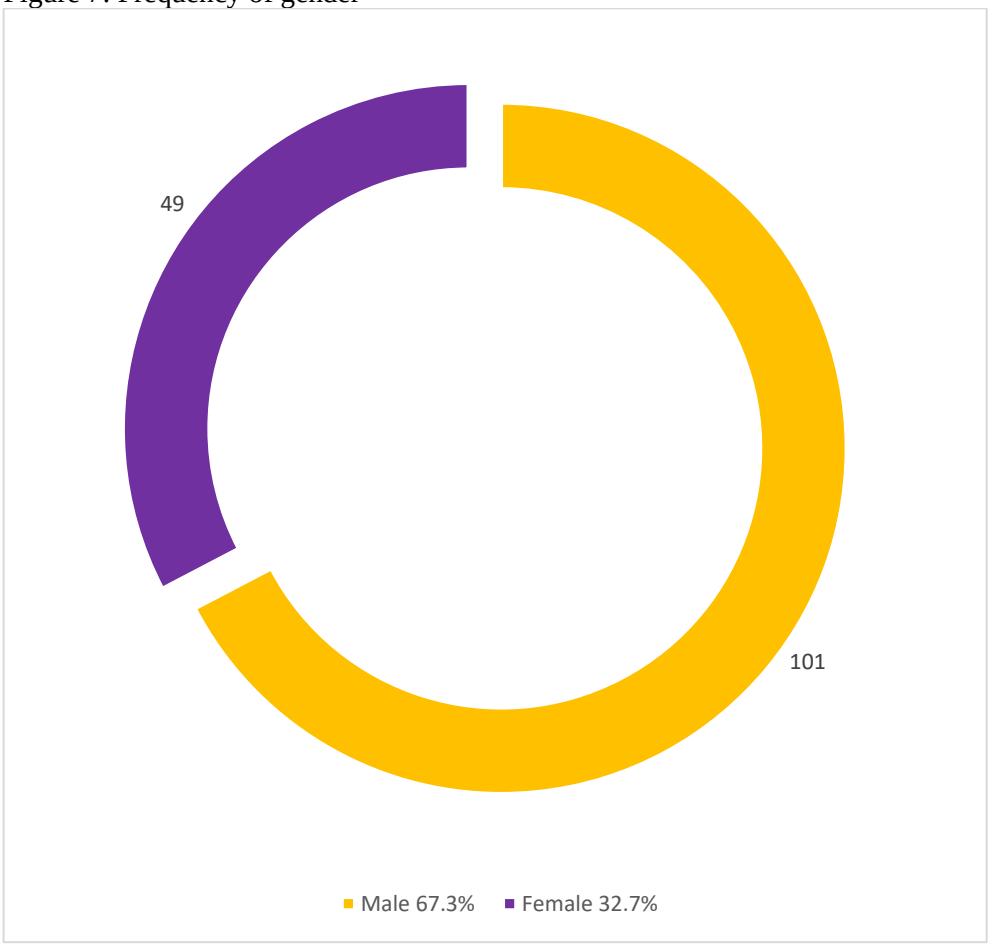

Table 4: Physical parameters of sampled population

	N	Minimum	Maximum	Mean	Std. Deviation
Weight (kg)	150	47	90	70.92	11.762
Height (cm)	150	132	187	156.81	15.151
BMI (kg/m2)	150	17.30	40.20	28.7040	5.92381

Table 5: Vitamin D levels in sampled population

	N	Minimum	Maximum	Mean	Std. Deviation
Vitamin D levels (ng/dl)	150	10.2	80	39.16	11.28

Table 6: Frequency of vitamin D deficiency in sampled population

		Frequency	Percent
Vitamin D deficiency	Present	97	64.7
	Absent	53	35.3
	Total	150	100.0

Table 7: Data stratification for frequency of vitamin D deficiency and age groups

			Vitamin D deficiency		Total
			Present	Absent	
Age groups	18-30 years	Count	43	24	67
		% within Age groups	64.2%	35.8%	100.0%
	31-60 years	Count	54	29	83
		% within Age groups	65.1%	34.9%	100.0%
p-value 0.911 not significant					

Table 8: Data stratification for frequency of vitamin D deficiency and gender

			Vitamin D deficiency		Total
			Present	Absent	
Gender	Male	Count	61	40	101
		% within Gender	60.4%	39.6%	100.0%
	Female	Count	36	13	49
		% within Gender	73.5%	26.5%	100.0%
p-value 0.115 not significant					

Table 9: Data stratification for frequency of vitamin D deficiency and BMI

			Vitamin D deficiency		Total
			Present	Absent	
BMI2	BMI <30	Count	57	29	86
		% within BMI2	66.3%	33.7%	100.0%
	BMI > 30	Count	40	24	64
		% within BMI2	62.5%	37.5%	100.0%
p-value 0.632 not significant					

Table 10: Data stratification for frequency of vitamin D deficiency and exposure to sunlight

			Vitamin D deficiency		Total
			Present	Absent	
Sun exposure	Less than 6 hours	Count	82	15	97
		% within Sun exposure	84.5%	15.5%	100.0%
	More than 6 hours	Count	15	38	53
		% within Sun exposure	28.3%	71.7%	100.0%
p-value <0.001 significant					

Table 11: Data stratification for frequency of vitamin D deficiency and milk intake

			Vitamin D deficiency		Total
			Present	Absent	
Milk intake	Adequate	Count	83	37	120
		% within Milk intake	69.2%	30.8%	100.0%
	Inadequate	Count	14	16	30
		% within Milk intake	46.7%	53.3%	100.0%
p-value 0.021 significant					

Table 12: Data stratification for frequency of vitamin D deficiency and functional activity

			Vitamin D deficiency		Total
			Present	Absent	
Functional activity	Fully active	Count	26	24	50
		% within Functional activity	52.0%	48.0%	100.0%
	Decrease activity	Count	71	29	100
		% within Functional activity	71.0%	29.0%	100.0%
p-value 0.022 significant					

DISCUSSION

Vitamin D refers to a group of fat-soluble secosteroid hormones, and is typically ingested in dietary sources or manufactured in the skin after exposure to sunlight. Increasing evidence suggests that vitamin D has many roles beyond its classically described effects on calcium homeostasis and bone health. Research suggests possible associations between suboptimal levels of vitamin D and development of various diseases, including pulmonary disorders, chronic rhinitis, tonsillar hypertrophy, metabolic syndrome, type 2 diabetes, hypertension, cancers of the breast, colon, and prostate, poor stress resilience, depression and cognitive decline. Vitamin D appears to be necessary for skeletal muscle as well and its deficiency has been associated with nonspecific musculoskeletal pain, chronic pain, low back pain and myopathy. [13] The aim of our study was determine prevalence of vitamin D deficiency in patients with chronic fatigure

In our sampled population total 150 patients were enrolled with mean age of 35.3±12.8 years. Most of patients belonged to elder age group i.e. 55.3%. There were 67.3% males and 32.7% females. Mean weight of sampled population was 70.9±11.7 kg, mean height was 156.8±15.1 cm and mean BMI was 28.7±5.9 kg/m2. Mean vitamin D levels was 39.16±11.2 ng/dl. Vitamin D deficiency was present in 64.7% patients. There was no effect of age on frequency of vitamin D deficiency, p-value 0.911. There was no effect of gender on frequency of vitamin D deficiency, p-value 0.115. There was no effect of BMI on frequency of vitamin D deficiency, p-value 0.632. Decrease sun exposure was associated with increased frequency of vitamin D deficiency, p-value <0.001. Decrease milk intake was associated with

increased frequency of vitamin D deficiency, p-value 0.021. Reduced physical activity was associated with increased frequency of vitamin D deficiency, p-value 0.022.

Our results were similar to other local and international studies.

Vitamin D deficiency is still under-diagnosed. In USA 33% patients present with the complain of chronic fatigue and out of which 77.2% patients are Vitamin D deficient.[4] In Holick MF[5] study almost 30% of patients present as proximal muscle weakness and pain before the biochemical signs of vitamin D deficiency appear leading to unnecessary investigative work up and in local studies conducted in Northern Pakistan almost 73.2% patients are Vitamin D deficient[6].In another study which conducted in Karachi almost 66.1% adults have Vitamin D deficiency.[7] The association of vitamin Deficiency with chronic fatigue and pains has also been in reported in different case series as well. [13-14]

In a similar study done in Europe 240 patients were enrolled with mean age of 69.10 ± 5.80and mean BMI was 24.80 ± 3.40kg/m2. Mean vitamin D level was 39.50 ± 11.80nmol/L. [15] All results matched with our study. In other study 85 patients with chronic fatigue were enrolled. Mean age was 62.7±4.3, mean BMI was 26.1±7.6kg/m2 and mean vitamin D levels were 23.8±2.9nmol/L. [16] In study conducted in patients of chronic fatigue the prevalence of vitamin D deficiency, defined as a level <20 ng/ml was 54%, the optimal level of vitamin D (30 ng/ml) was observed in 10 % of patients, respectively. [17]. A double-blind placebo-controlled clinical trial was done to investigate the efficacy of per os vitamin D3 (cholecalciferol) in treating fatigue among otherwise healthy persons with low serum 25-hydroxyvitamin D (25(OH)D) levels. We enrolled 120 individuals (mean age 29 ± 6 years, 53% women) presenting with fatigue and vitamin D deficiency (serum 25(OH)D < 20 μg/L). Participants were randomized to a single oral dose of 100,000 units of vitamin D or placebo. The primary endpoint was intra-individual change in the fatigue assessment scale (FAS) at 4 weeks after treatment. Mean FAS decreased significantly more in the vitamin D group (−3.3 ± 5.3; 95% confidence interval [CI] for change −14.1 to 4.1) compared with placebo (−0.8 ± 5.3; 95% CI for change −9.0 to 8.7); (P = 0.01). Amelioration of fatigue was reported more frequently in vitamin D than in placebo group (42 [72%] vs. 31 [50%]; P = 0.01; odds ratio [OR] 2.63, 95% CI for OR 1.23–5.62). Among all participants, improvement in fatigue score correlated with the rise in 25(OH)D level (R = −0.22, P = 0.02). It was concluded that vitamin D treatment significantly improved fatigue in otherwise healthy persons with vitamin D deficiency. [18]

All these studies validate the results of our study.

CONCLUSION

Vitamin D deficiency is very common in patients with chronic fatigue, suggesting that supplementation may be helpful in reducing the risk of fatigue. Further larger studies and multidimensional follow-up are needed to confirm these findings.

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PROFORMA

Prevalence of Serum Vitamin D deficiency in patients of Chronic Fatigue without any other systemic illness

CASE #

DATE

Hospital Registration

Serial

Patient Name: _____

Age: _____ Gender: o Male o Female

Socio economic status: _____ BMI:_____

Daily Sun Exposure (Hours):_____

Milk Intake: _____

Functional status: o Fully active o Decreased activity

Serum Vit.D level: _____

Vitamin d level: _____

Frequency of vitamin D deficiency: Yes/No