

# Vitamin D Levels and Socio-Demographic Profile of Psychiatric Patients - A Hospital based Study

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## ABSTRACT

**Introduction:** Vitamin D is increasingly being recognized as important for brain health, apart from its importance in endocrine and bone health. There is evidence that vitamin D deficiency is also related to medical problems such as obesity, diabetes mellitus, and hypertension, to which patients with psychiatric illnesses are particularly vulnerable. Hence, the present study was undertaken to assess Vitamin D levels in psychiatric patients.

**Material and Methods:** The present study was conducted among 108 psychiatric patients visiting out-patient department for psychiatry treatment at district hospital, Namchi, South Sikkim. Vitamin D levels were estimated using serum 25-hydroxy vitamin D (25[OH]D). Data so obtained was analyzed using SPSS-20 and was expressed as number and percentage as required.

**Results:** Assessment of Vitamin D<sub>3</sub> levels (ng/ml) among psychiatric patients revealed that 23 (22%) had Vitamin D<sub>3</sub> levels up to 10 ng/ml, 48 (44%) had 11-20 ng/ml and 37 (34%) had Vitamin D<sub>3</sub> levels ranging 21-30 ng/ml.

**Conclusion:** Assessment of Vitamin D levels among psychiatric patients revealed that majority of patients had insufficient Vitamin D levels. Thus, evaluation and treatment of vitamin D deficiency should be considered to protect musculoskeletal health.

**Keywords:** Cholecalciferol; Vitamin D; Mental Health

## INTRODUCTION

Vitamin D is increasingly being recognized as important for brain health, apart from its importance in endocrine and bone health. Evidence is emerging implicating its role in brain development and function. It affects early brain development by acting as a potent differentiating factor for brain cells by increasing neurite outgrowth, regulation of neurotrophic factors and reactive oxygen species, and downregulating calcium channels.<sup>1</sup>

Vitamin D consists of 2 bioequivalent forms. Vitamin D<sub>2</sub> (D<sub>2</sub>), also known as ergocalciferol, is obtained from dietary vegetable sources and oral supplements. Vitamin D<sub>3</sub> (D<sub>3</sub>), also known as cholecalciferol, is obtained primarily from skin exposure to ultraviolet B (UVB) radiation in sunlight, ingestion of food sources such as oily fish and variably fortified foods and oral supplements. Both D<sub>2</sub> and D<sub>3</sub> are biologically inert. Once absorbed from the intestine, they are metabolized in the liver to 25-hydroxyvitamin D [25(OH)D], composed of 25(OH)D<sub>2</sub> and 25(OH)D<sub>3</sub>; 25(OH)D (also called calcidiol) is subsequently converted to 1,25-dihydroxyvitamin D [1,25(OH)<sub>2</sub>D], also known as calcitriol, in the kidney and select other tissues by the action

of the 1 $\alpha$ -hydroxylase enzyme.<sup>2</sup> 25OHD 1 $\alpha$ -hydroxylase enzyme is changed into its active form 1.25 hydroxyvitamin D (1.25-OHD). Until recently it was thought that 1 $\alpha$ -hydroxylase enzyme was only found in the kidneys, but recent studies indicate that 1 $\alpha$ -hydroxylase is also found in the brain and other tissues. The latest studies show Vitamin D receptors (VDR) and 1 $\alpha$ -hydroxylase enzymes in the central nervous system, in neurons and in glial cells. The strongest immunohistochemical staining for both these receptors and enzymes has appeared in the hypothalamus and within the substantia nigra, suggesting that vitamin D may have autocrine (in other words the activity of vitamin D arises from 1.25OHD synthesized within those cells) and/or paracrine (or 1.25OHD is synthesized in one cell type and acts within adjacent cells) properties in the human brain.<sup>3</sup> Insufficient vitamin D has been linked to depressive symptoms, cognitive impairment, and the development of schizophrenia. There is evidence that vitamin D deficiency is also related to medical problems such as obesity, diabetes mellitus, and hypertension, to which patients with psychiatric illnesses are particularly vulnerable.<sup>4</sup> Hence, the present study was undertaken to assess Vitamin D levels in psychiatric patients.

## MATERIAL AND METHODS

The present hospital based study was conducted among 108 psychiatric patients randomly selected of either sex visiting out-patient department for psychiatry treatment at district hospital, Namchi, South Sikkim. The study was carried between March 2017 to February 2018.

Vitamin D levels were estimated using serum 25-hydroxy vitamin D (25[OH]D). There is no general consensus on recommended cutoff serum levels of vitamin D to diagnose deficiency. The Institute of Medicine<sup>5,6</sup> recommends that a level < 12 ng/mL indicates vitamin D deficiency, and levels between 12 ng/mL and 20 ng/mL indicate inadequacy. The Endocrine Society Clinical Practice Guidelines<sup>6,7</sup> recommend a level < 20 ng/mL as indicative of vitamin D deficiency, and levels between 21 ng/mL and 29 ng/mL as indicative

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of vitamin D insufficiency. In the present study, we divided vitamin D levels into three groups i.e. up to < 10 ng/mL as patients with vitamin D deficiency, levels 11 to 20 ng/mL as patients with vitamin D insufficiency and levels 21 to 30 ng/mL as patients with normal vitamin D levels but need to be cautious for probable health care. Data so obtained was analyzed using SPSS-20 and was expressed as number and percentage as required.

## RESULTS

Table 1 shows distribution of patients according to age and gender with maximum number of individuals in the age group of 21-40 years i.e. 50 (46%) among 108, followed by 36% in 41-60 years age group, 10% in 61-80 years age group and 7% with age up to 20 years. Sociodemographic distribution

Age	Total	Male	Female
Up to 20 years	8	3	5
21-40 years	50	17	33
41-60 years	39	8	31
61-80 years	11	3	8
Total	108	31	77

**Table-1:** Distribution of patients according to age and gender

showed that among 108, 62 resided in urban area, 40 in rural and 6 in semiurban. Table 2 shows distribution of patients according to education, marital status, socioeconomic status, religion, occupation and substance dependence. Among 108 psychiatric patients, 47 were employed, 16 were unemployed, 26 were housewife, 5 were farming, 6 were business, 8 were students. Among 108 psychiatric patients, 15 were addicted to tobacco, 10 to alcohol and 5 to ganja. Regarding distribution of patients according to stressful life events (table 3), 20 had marital conflicts, 25 had family problems, 15 had problems related to job, 17 had reported illness and 31 did not reported any such events.

Table 4 shows diagnosis of patients according to ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification) with 45 (42%) suffering from major depression disorder, 12 (11%) suffering from anxiety disorders, 33 (31%) suffering from schizophrenia, 4 (3.7%) suffering from bipolar disorder, 10 (9%) suffering from somatoform disorder and 4 (3.7%) suffering from seizure disorder. Table 5 shows physical comorbidity among patients with 11 (10%) suffering from hypothyroidism, 15 (14%) suffering from osteoarthritis (knee joints), 14(13%) suffering from prolapsed intervertebral disc (PIVD), 14

Variables		Total	Male	Female
Residence	Urban	62	21	41
	Rural	40	1	5
	Semiurban	6	9	31
Education	Up to matriculation	57	10	47
	Higher secondary	16	5	11
	Graduate and above	24	13	11
	Illiterate	11	3	8
Marital status	Married	79	22	57
	Divorced	5	1	4
	Unmarried	24	8	16
Socioeconomic status	Low	58	14	44
	Middle	15	4	11
	High	35	13	22
Religion	Hindu	83	21	62
	Buddhist	25	10	15
Occupation	Employed	47	16	31
	Unemployed	16	3	13
	Housewife	26	0	26
	Farming	5	5	0
	Business	6	6	0
	Students	8	1	7
Substance Dependence	Tobacco	15	8	7
	Alcohol	10	7	3
	Ganja	5	5	0

**Table-2:** Distribution of patients according sociodemographic details

Stressful life events	Total	Percentage
Marital Conflicts	20	19%
Family problems	25	23%
Job	15	14%
Illness	17	16%
Reporting not any such event	31	28%

**Table-3:** Distribution of patients according to Stressful life events

Diagnosis	Total	Male	Female
Major Depression Disorder	45 (42%)	12	33
Anxiety disorders	12 (11%)	5	7
Schizophrenia	33 (31%)	8	25
Bipolar Disorder	4 (3.7%)	2	2
Somatoform Disorder	10 (9%)	2	8
Seizure Disorder	4 (3.7%)	2	2

**Table-4:** Diagnosis of patients according to ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification)

Physical Comorbidity	Total	Male	Female
Hypothyroidism	11 (10%)	1	10
Osteoarthritis (Knee joints)	15 (14%)	4	11
Prolapsed Intervertebral Disc (PIVD)	14 (13%)	2	12
Hypertension	14(13%)	3	11
Diabetes Mellitus	12 (11%)	4	8

**Table-5:** Physical Comorbidity among patients

Vitamin D <sub>3</sub> levels (ng/ml)	Total	Male	Female
Upto 10	23 (22%)	5	18
11-20	48 (44%)	12	36
21-30	37 (34%)	14	23
Total	108	31	77

**Table-6:** Vitamin D<sub>3</sub> levels (ng/ml) among psychiatric patients

(13%) suffering from hypertension and 12 (11%) suffering from diabetes mellitus. Assessment of Vitamin D<sub>3</sub> levels (ng/ml) among psychiatric patients (table 6) showed 23 (22%) had Vitamin D<sub>3</sub> levels up to 10 ng/ml, 48 (44%) had 11-20 ng/ml and 37 (34%) had Vitamin D<sub>3</sub> levels ranging 21-30 ng/ml.

## DISCUSSION

In the present study, diagnosis of patients according to ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification) with 45 (42%) suffering from major depression disorder, 12 (11%) suffering from anxiety disorders, 33 (31%) suffering from schizophrenia, 4 (3.7%) suffering from bipolar disorder, 10 (9%) suffering from somatoform disorder and 4 (3.7%) suffering from seizure disorder. Itzhaky D et al<sup>8</sup> assessed vitamin D serum concentrations in patients with major depression and schizophrenia as compared to healthy controls and determined if a correlation exists between serum levels of vitamin D and disease activity. Lower serum vitamin D concentrations were detected among patients with schizophrenia ( $15.0 \pm 7.3$  ng/ml) compared to patients with depression ( $19.6 \pm 8.3$  ng/ml) and to controls ( $20.2 \pm 7.8$  ng/ml,  $P < 0.05$ ). Thus, serum vitamin D levels were lower in patients with schizophrenia as compared to patients with depression and to healthy controls. Menkes DB et al<sup>9</sup> studied vitamin D status in an unselected sample of adult psychiatric inpatients during late winter. Vitamin D varied by diagnosis, with schizophrenia associated with markedly lower levels than mania and depression ( $p < 0.001$ ). Patel D et al studied prevalence of vitamin D deficiency in adult patients admitted to a psychiatric hospital Vitamin D deficiency is highly

prevalent among individuals with severe mental illness admitted to hospital.

Bicikova M et al<sup>10</sup> conducted a cross-sectional study in which levels of calcidiol (the precursor of vitamin D<sub>3</sub>) were determined in groups of depressive men and women and in men and women with anxiety disorders and compared with age matched controls. Significantly lower levels of calcidiol were found in men and women with depression as well as in age matched patients with anxiety disorders. Armstrong DJ et al<sup>11</sup> studied patients of fibromyalgia as Fibromyalgia is a complex problem in which symptoms of anxiety and depression feature prominently and found deficient levels of vitamin D in 13.3% of the patients, while 56.0% had insufficient levels and 30.7% had normal levels.

In the present study, assessment of Vitamin D<sub>3</sub> levels (ng/ml) among psychiatric patients showed 23 (22%) had Vitamin D<sub>3</sub> levels up to 10 ng/ml, 48 (44%) had 11-20 ng/ml and 37 (34%) had Vitamin D<sub>3</sub> levels ranging 21-30 ng/ml. Vitamin D is produced by skin exposed to ultraviolet B radiation or obtained from dietary sources, including supplements. Persons commonly at risk for vitamin D deficiency include those with inadequate sun exposure, limited oral intake, or impaired intestinal absorption. Vitamin D adequacy is best determined by measurement of the 25-hydroxyvitamin D concentration in the blood.<sup>2</sup> Factors such as low sunlight exposure, age-related decreases in cutaneous synthesis, and diets low in vitamin D contribute to the high prevalence of vitamin D inadequacy. Vitamin D production from cutaneous synthesis or intake from the few vitamin D-rich or enriched foods typically occurs only intermittently. Supplemental doses of vitamin D and sensible sun exposure could prevent deficiency in most of the general population.<sup>12</sup>

## CONCLUSION

Assessment of Vitamin D levels among psychiatric patients revealed that majority of patients had insufficient Vitamin D levels. Thus, evaluation and treatment of vitamin D deficiency should be considered to protect musculoskeletal health.

## REFERENCES

1. Chauhan N, Padhy SK, Shah R, Malhotra S. Vitamin D deficiency in children with psychiatric illness in a tertiary care hospital in North India. *J Neurosci Rural Pract* 2019;10:16-20.
2. Kennel KA, Drake MT, Hurley DL. Vitamin D deficiency in adults: when to test and how to treat. *Mayo Clin Proc.* 2010;85:752-7; quiz 757-8.
3. Bulut SD, Bulut S, Atalan DG, Berkol T, Gürçay E, Türker T, Aydemir Ç. The relationship between symptom severity and low vitamin D levels in patients with schizophrenia. *PLoS one.* 2016;11:e0165284.
4. McCue RE, Charles RA, Orendain GC, Joseph MD, Abanishe JO. Vitamin d deficiency among psychiatric inpatients. *Prim Care Companion CNS Disord.* 2012;14:PCC.11m01230.
5. Ross AC, Taylor CL, Yaktine AL, et al., editors. *Dietary Reference Intakes for Calcium and Vitamin D.* Institute of Medicine Committee to Review Dietary Reference Intakes for Vitamin D and Calcium. Washington, DC: National Academies Press; 2011.
6. Chekuri L, Thapa PB, Turturro CL, Mittal D, Messias E. Vitamin D levels and sociodemographic and clinical correlates in individuals with serious mental illness admitted to an acute psychiatry unit. *The primary care companion for CNS disorders.* 2015;17(2).
7. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, Murad MH, Weaver CM. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism.* 2011;96:1911-30.
8. Itzhaky D, Amital D, Gorden K, Bogomolni A, Arnson Y, Amital H. Low serum vitamin D concentrations in patients with schizophrenia. *Sat.* 2012;5:19.
9. Menkes DB, Lancaster K, Grant M, Marsh RW, Dean P, du Toit SA. Vitamin D status of psychiatric inpatients in New Zealand's Waikato region. *BMC psychiatry.* 2012;12:68.
10. Bicikova M, Duskova M, Vitku J, Kalvachova B, Ripova D, Mohr P, Stárka L. Vitamin D in anxiety and affective disorders. *Physiological research.* 2015;64:S101.
11. Armstrong DJ, Meenagh GK, Bickle I, Lee AS, Curran ES, Finch MB. Vitamin D deficiency is associated with anxiety and depression in fibromyalgia. *Clinical rheumatology.* 2007;26:551-4.
12. Holick MF. High prevalence of vitamin D inadequacy and implications for health. *In Mayo Clinic Proceedings* 2006;81:353-373.

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