

A Study of Vitamin D among Patients Presenting in the Psychiatric OPD of Manipal Teaching Hospital, Pokhara

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ABSTRACT

Background

There have been growing interests in the association between vitamin D and depression in recent years.

Objective

The objective of this study was to find the prevalence of low vitamin D level in the patients suffering from depressive episodes. The next objective was to determine whether there are any statistically significant differences between the mean vitamin D levels of different sociodemographic variables and also to find the socio-demographic variables predicting the vitamin D level.

Method

The patients diagnosed as depressive episodes were selected from the out-patient unit of Department of Psychiatry of Manipal Teaching Hospital, Pokhara. The proforma was used to collect the sociodemographic profile of the patient. The diagnosis of depressive episode was made according to the International Classification of Disease-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research. The serum vitamin D level of less than 30 ng/ml was considered as low level in this study.

Result

The prevalence of low vitamin level was found in 81.8%. The mean difference of vitamin D level was statistically significant in gender and marital status of the patients. The low mean vitamin level was found in the socio-demographic variables like in age above 60 years, Newar caste, female gender, separated from the spouse patients and in the patients living in the urban area as compared to other group of patients. The gender of the patients predicted vitamin D level in the depressed patients.

Conclusion

There is high prevalence of low vitamin D level in the depressed patients. The correction of low vitamin D level would be helpful in the holistic management of patient with depressive episodes.

KEY WORDS

Depression, Prevalence, Vitamin D

INTRODUCTION

Vitamin D denotes cholecalciferol which is produced by the action of ultraviolet light on 7- dehydrocholesterol in the skin of humans. The vitamin D is hydroxylated into 25- hydroxy vitamin, which is the major circulating form of vitamin D.¹ Vitamin D is a steroid hormone with pleiotropic effects on calcium and phosphorus metabolism and the immune system.² The low levels of vitamin D was present in one third to one half of healthy middle-aged to elderly adults.³ Many population-based epidemiological studies had reported high prevalence of vitamin D deficiency.⁴ The prevalence of vitamin D deficiency was 73.68% in the patients of the Western region of Nepal.⁵

Vitamin D deficiency is a common underdiagnosed condition that has been receiving attention in the world. The evidence had suggested that vitamin D is important for reducing the risk of a variety of chronic illnesses such as mental disorders.^{6,7} Vitamin D is crucial not only for bone health but for proper brain development and psychological functioning. Although the biologic implications of vitamin D are known, the relationship between vitamin D deficiency and mental disorders is not well understood.⁸ This study has been conducted to fulfill these lacunae.

The objective of this study was to find the prevalence of low vitamin D level in the patient suffering from depressive episodes attending Psychiatry OPD of Manipal Teaching Hospital, Pokhara. The next objective was to determine whether there are any statistically significant differences between the mean vitamin D levels of different sociodemographic variables and also to find the socio-demographic variables predicting the vitamin D level in patient suffering from depression.

METHODS

This cross sectional study was conducted in the out-patient unit of Department of Psychiatry of Manipal Teaching Hospital located in Pokhara in the Gandaki Province of Nepal. The ethical clearance of the study was taken from Institutional Review Committee of Manipal College of Medical Sciences, Pokhara before the start of the study. The study was conducted for six months (from January 2019 to June 2019). The sixty-six patients who had fulfilled the diagnostic criteria of depressive episode (unipolar, single episode or recurrent episode) according to International Classification of Disease-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research (ICD-10 DCR) were selected.⁹ The consent was taken from each patient and from the relatives of the patients if the patient was unable to give consent because of unstable mental state. The patients with comorbid psychiatric/medical/surgical conditions, pregnancy, lactating mother and the patient who had not given the informed consent

were excluded from the study. The patients taking any other drugs/medicine on regular basis were also excluded.

A self-designed proforma was used to record the sociodemographic data of the patients. The blood samples of all patients were sent for vitamin D estimation. The serum vitamin D level of more than 30 ng/ml was considered sufficient, value between 12 ng/ml to 29 ng/ml was considered insufficient level and the value below 11 ng/ml was considered deficient level in the current study. The operational definition of "low or inadequate level" of vitamin D in the current study was serum vitamin level of less than 30 ng/ml (which includes both insufficient and deficient level).

Data entry and analysis was done in Epi-Info version 7.2.2.6. The statistical methods used were mean and percentages. The mean difference of vitamin D level in patients with the different socio-demographic variables was tested using one-way analysis of variance (ANOVA). The multiple linear regression analysis was used to predict vitamin D level with the age, residence (urban/rural) and gender (male/female). The data was considered statistically significant if p value is less than 0.05.

RESULTS

Table 1 showed mean vitamin D level of the patients according to different socio-demographic variables. The mean difference of vitamin D level was statistically significant in gender (p-value=0.0047) and marital status (p-value= 0.0225) of the patients. The mean vitamin D level was found to be low in the patients aged above 60 years, Newar caste and in the female gender. The mean level of vitamin D was also found to be low in patients who were separated from the spouse and those living in the urban area as compared to other group of patients. The mean age of the patients was 38.25 years with the standard deviation of 11.72 years.

Table 2 showed that the prevalence of low level of vitamin D was 81.8%. Among them, the insufficiency level was noted in 66.7% and deficiency level in 15.1% samples.

Table 3 showed the multiple linear regression analysis where vitamin D level was taken as dependent variables and age, residence (urban/rural) and gender (male/female) as independent variables (predictors). There was statistically significant linear relationship between gender and vitamin D level. The significant relationship between gender and vitamin D level was found even when age and residence of the patients were adjusted as shown in table 4. This indicated that gender predicted the value of vitamin D level in the patients suffering from depressive episodes.

Table 1. Socio-demographic profile and vitamin D level of the patients. (n=66)

Socio demographic variables		Vitamin D Level			Total	Mean Vit D level (±SD)
		Insufficiency n(%)	Deficiency n(%)	Sufficiency n(%)		
Age Groups (in years)	20-39	26(72.2)	4(11.1)	6(16.7)	36	21.43(±9.34)
	40-59	16(59.3)	5(18.5)	6(22.2)	27	21.44(±11.84)
	>59	2(66.7)	1(33.3)	0(0.0)	3	19.15(±11.85)
Caste	Brahmin/Chhetri	22(61.1)	6(16.7)	8(22.2)	36	22.51(±11.49)
	Mongoloids	16(69.6)	3(13.0)	4(17.4)	23	20.85(±9.07)
	Newar	1(100)	0(0.0)	0(0.0)	1	12.57
	Others	5(83.3)	1(16.7)	0(0.0)	6	17.55(±8.31)
Gender*	Female	30(73.2)	7(17.1)	4(9.7)	41	18.57(±7.99)
	Male	14(56.0)	3(12.0)	8(32.0)	25	25.87(±12.28)
Marital Status*	Married	38(69.1)	5(9.1)	12(21.8)	55	23.02(±10.24)
	Separated	1(50.0)	0(0.0)	0(0.0)	2	8.33(±7.53)
	Unmarried	3(75.0)	1(25.0)	0(0.0)	4	14.92(±5.53)
	Widow(er)	2(40.0)	3(60.0)	0(0.0)	5	13.14(±6.95)
Residence	Rural	17(60.7)	4(14.3)	7(25.0)	28	22.72(±12.30)
	Urban	27(71.1)	6(15.8)	5(13.1)	38	20.31(±8.71)
Total		44(66.7)	10(15.1)	12(18.2)	66	21.33(±10.38)

Mean age of the patients: 38.25 years (±11.72)

*Mean difference in vitamin D Level was statistically significant in gender (p value=0.0047) and marital status (p value=0.0225)

Table 2. Level of Vitamin D of the patients. (n=66)

Vitamin D level	Number	Percentage
Insufficiency	44	66.7
Deficiency	10	15.1
Sufficiency	12	18.2
Total	66	100

Total low level (Insufficiency+Deficiency): 54 (81.8%)

Table 3. Regression analysis taking vitamin D level as dependent variable. (n=66)

Variables	Coefficients	95% Confidence	Limits	Standard Error	F test	P value
Age	0.026	-0.195	0.247	0.111	0.0539	0.8172
Residence (Urban / Rural)	-2.407	-7.577	2.764	2.588	0.8646	0.3559
Gender (Male / Female)	7.303	2.323	12.283	2.493	8.5815	0.0047

Table 4. Regression analysis of gender taking vitamin D level as dependent variable (adjusted for age and residence). (n=66)

Variables	Coefficients	95% Confidence	Limits	Standard Error	F-test	P-value
Age	0.041	-0.171	0.253	0.106	0.1496	0.7002
Residence (Urban/ Rural)	-0.041	-5.338	5.256	2.650	0.0002	0.9876
Gender (Male/ Female)	7.337	1.957	12.717	2.691	7.4316	0.0083

DISCUSSION

This cross-sectional study was done in the tertiary care hospital to understand the prevalence of low vitamin D level in the patient diagnosed as depressive episodes according to ICD-10 DCR.

In this study, the mean vitamin D level was low in the age group above 60 years as compared to other age group patients and the difference in level was not statistically significant. Several studies have shown significant differences in vitamin D levels with age.¹⁰⁻¹² The elderly people produce less cholecalciferol with the same exposure to UVB light and they also spend less time outside in the sun as compared to younger adults.¹³

In this study, the mean age of the sample was 38.25 years (±11.72 years). The mean age of the respondent found in one study in Nepal was 38.3 years (±10.2 years) which is almost similar to our study findings.¹⁴

In this study, there was no statistically significant association of mean vitamin D level with caste of the patient. Similarly, a study conducted in the Eastern Nepal also found no association of caste with vitamin D level.¹⁴

In the present study, the prevalence of low level of vitamin D was seen more in females (90.3%) as compared to males (68.0%) and the mean difference of vitamin D level between gender was statistically significant. Similarly, the other Nepalese study also found that female (85.7%) had more prevalence of low vitamin D level as compared to males (61.5%).¹⁴ The female's preponderance as compared to males was also noted by other studies.^{11,12,15-17} This could be explained by the fact that females in Nepal are involved mainly in indoor household activities which deprived them from sunlight as compared to males.

In our study, the frequency of low vitamin D level was 78.2% in married and 100% in separated, unmarried and widow/widower samples. The unequal distribution of the sample could be the reason for the vast difference in the prevalence rates in the current sample. The study done in Dharan, Nepal found the prevalence of low vitamin D level

of 88.2% in the marital discord sample which is followed by 86.1% in the unmarried sample and 77.1% in the married sample.¹⁴

In this study, the prevalence of low vitamin D level was noted more in patients living in urban area (86.9%) than in rural area (75%). The other study also observed higher prevalence of vitamin D deficiency in the urban setting compared to those living in the rural setting.¹⁵ The studies have identified air pollution as a factor in vitamin D deficiency. The air pollution level could affect the sun exposure that a person is getting.^{18,19}

In our study, the prevalence of low vitamin D level was 81.8% (Table 2). Similarly, other studies conducted in South Asia also found high prevalence of low vitamin level.^{14,20}

In this study, the mean value of vitamin D level was 21.33 ng/ml (± 10.38). The other studies showed the mean level of 21 ng/ml, 16 ng/ml, 21.77 nm/l and 30.4 ng/ml.²⁰⁻²³ The low level of vitamin D level could be explained by the different facts like patient with depression spend less time outdoors, they are less physically active and they also have decreased appetite.²⁴ Few studies had found no or inverse association between vitamin D and depression.^{22,25,26}

The multiple linear regression analysis showed that gender predicted vitamin D level even after adjusting for age and residence of the patients in our study sample (Table 3 and 4). The predictors in the study done in Pakistan were age, town of residence and housing structure.²⁰ The other study didn't found association of gender with depressive score.²³

The difference in the prevalence rates of the different studies could be due to difference in the nutritional status of the participants being surveyed. The different study design and confounding factors in various studies could lead to the mixed findings. The use of different assessment

tools for measuring depression could be another reason for the difference in the study findings. Lifestyle differences between the samples of the populations could also account for the variations of vitamin D status among different populations.²⁶

There are few limitations in this study. The cause and effect relationship could not be estimated due to the cross-sectional nature of this study. Hence, it is not known whether low vitamin D leads to depression or vice versa. The next limitation is that as this study was conducted in the hospital setting, the findings couldn't be generalized to the entire populations. But from the mental health perspective, the high prevalence of low vitamin D level in the Nepalese depressive patients at large is a matter of concern. The early intervention would have enormous impact on the long term prognosis.

CONCLUSION

The prevalence of low vitamin D level was 81.8% in the patients suffering from depressive episodes. The mean difference of vitamin D level was statistically significant in gender and marital status of the patients. The socio-demographic variables found to have low vitamin D level were aged above 60 years, Newar caste, female gender, separated from the spouse patients and in the residents from urban area as compared to other group of patients. The gender of the patients predicted vitamin D level in the depressive patients significantly. There is a need for raising awareness and encouragement of safe and moderate exposure of skin to ultraviolet light in depressed patients. This study also highlights the need for large scale randomized controlled trials in future studies to test whether this association is causal.

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