

# Role of Vitamin D as Adjuvant Therapy of Hypovitaminosis D in Patients of Schizophrenia

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## ABSTRACT

**Background:** It is suggestive epidemiologically that the schizophrenia etiology may include the heritable as well as environmental influence also. Although an important role may also been played by other molecular mechanisms that refer the genetic and environmental interaction.

**Aim:** To evaluate role of vitamin d as adjuvant therapy of hypovitaminosis D in patients of schizophrenia.

**Methods:** An observational case control design was opted to the study, where the schizophrenia patients visiting the outpatient department of Mayo Hospital were recruited for this study. The recruited patients were actually belongs to two categories of schizophrenia a) in remission named as group A and b) with an acute episode named as group B. Moreover age and sex matched controls (named as group C) were also recruited for this study. For the current study, the entire renal failure patients, the patients having past surgical history and the patients with the heart disease were excluded and all the patients that were 18 and above years old having schizophrenia that was declared as per the Diagnostic and Statistical (DS) Manual of Mental Disorders (MD), 4th edition, Text Revision (DSM-IV-TR) were included.

**Results:** The current study includes 120 patients. Out of which, 40 schizophrenia patients in remission (group A) and equal number of patients in schizophrenia acute episode group (group B) and same number of health controls (group C) with no psychopathology. The average patient's age in group A was 40± 8.9, in group B was 38.7±8.9 and group C was 41.55±10.55 with range 18-65 for all three groups. There were 26(65%) men and 14(35%) women in group A, 21(52.5%) men and 19(47.5%) women in group B and 18(45%) men and 22(55%) women in group C. We observed a significant lower total vitamin D level in acute episode patients than remission and control group (7.14, 15.02, 15.01 respectively P-value 0.001). The difference of the total vitamin D levels among the remission group and the healthy controls was found insignificant.

**Conclusions:** We may conclude that the vitamin D role as adjuvant therapy of hypovitaminosis d in patients of schizophrenia is very vital and well demonstrated by our study.

**Key words:** epidemiology, environmental interaction, Schizophrenia. Vitamin D

## INTRODUCTION

It is epidemiologically suggestive that the schizophrenia etiology might include the genomic as well as environmental influence also. Although an important role may also been played by other molecular mechanisms that refer the genetic and environmental interaction. [Popov et al. 2012] Since there are very less studies highlighting the vitamin role in the activities of the brain. Emerging evidences in neuropsychiatric diseases etiology and etiology of implicates sunlight being as a chief factor related to the environment. Vitamin D can be observed in two forms, a) the D3 form and b) as in vitamin D2 form or ergocalciferol [Holick et al, 2007]. Both the forms D2 and D3 are radially available in diet and it can be supplied in dierty forms except the vitamin D3 is only produced in skin through the ultraviolet B (UVB) radiation omitting from the sun or available in the sunlight. The human body is unable to produce the vitamin D2 that's why it is always taken through the fortified food or taken as a food supplement. The blood plasma of human body containing the vitamin D3 and D2 that are destined to the vitamin D binding protein, which is transported to liver, where both the vitamins are hydroxylated to produce the vitamin D, which is also known as 25-hydroxyvitamin D. Commonly the vitamin D is the metabolite to define the overall vitamin D standing as of the chief stowing form in the body of human [Hart et al. 2006].

The study main aim was to evaluate role of vitamin d as adjuvant therapy of hypovitaminosis d in patients of schizophrenia.

## MATERIAL AND METHODS

An observational case control design was opted to the study. All the schizophrenia patients visiting out patient department of Mayo hospital were recruited for this study. The recruited patients were actually belongs to two categories of schizophrenia a) in remission named as group A and b) with an acute episode named as group B. Moreover age and sex matched controls (named as group C) were also recruited for this study. The control group contains all the patients with no psychopathology. The duration of the study was of 09 months from april 2018 to december 2018 .The study venue was Mayo hospital lahore . For the current study, the entire renal failure patients, the patients having past surgical history and the patients with the heart disease were excluded and all the patients that were 18 and above years old having schizophrenia that was declared as per the Diagnostic and Statistical (DS) Manual of Mental Disorders (MD), 4th edition, Text Revision (DSM-IV-TR) were included. An additional criterion for inclusion was the patients must be in remission at least six months patients. This criteria was copied or opted from Andreasen et al. 2005. For acute

episode the patient only counted if it has a score level above 4 on positive and negative syndrome scale (PANSS) Firstly the blood samples from all patients was collected for estimation of vitamin D level and other biomarkers. The entire diagnostic values required, were collected from the blood by following their standard operating procedures in hospital laboratory. The entire demographics along with the clinical and diagnostic history for all patients collected via a pre-tested questionnaire. The patients or its attendant was asked to provide an informed consent and taken with their will. We took the hospital ethical committee approval to cover the ethical considerations.

**Statistical analysis:** The entire information from all the articles noted and putted electronically in MS EXEL sheets that laterally transformed into SPSS version 21 and analyzed using appropriate statistics. The data was descriptively assessed through the descriptive statistics like the mean and standard deviation. All the qualitative variables were presented in the form of frequency distribution and as percentages. Any P value that is less than 0.05 was pondered statistically significant.

## RESULTS

The current study includes 120 patients. Out of which, 40 schizophrenia patients in remission (group A) and equal

number of patients in schizophrenia acute episode group (group B) and same number of health controls (group C) with no psychopathology. The average patient's age in group A was 40±8.9, in group B was 38.7±8.9 and group C was 41.55±10.55 with range 18-65 for all three groups. There were 26(65%) men and 14(35) women in group A, 21(52.5%) men and 19(47.5%) women in group B and 18(45%) men and 22(55%) women in-group C. More of the patient's baseline features were given in table 1.

There was 10(25%) patients in group A that were vitamin D deficient (less than 10 ng/ml), 25(63.5%) in group B and 12(30%) in control group. 27 (67.5%) were with insufficient level (10-20 ng/ml) in group A, 12(30%) in group B and 20(50%) in group C. there were only 3(7.5%) patients with sufficient vitamin D level in group A, 3(7.5%) in group B and 8 (20%) in group C. The overall significance value was estimated to be 0.002. We observed a significant lower total vitamin D level in acute episode patients than remission and control group (7.14, 15.02, 15.01 respectively P-value 0.001). The difference of the total vitamin D levels in the remission group when compared with the healthy controls was not significant. The summary of the correlation statistics between vitamin D level and clinical outcomes were given in table 2.

Table 1: The baseline features of Typhoid fever patients.

Characteristics	Group A	Group B	Group C	Significance
N	40	40	40	
Age (mean± SD)	40± 8.9	38.7± 8.9	41.55±10.55	0.564
<b>Gender</b>				
Male	26(65%)	21(52.5%)	18(45%)	0.134
Female	14(35.%)	19(47.5%)	22(55%)	
<b>Marital status</b>				
Married	13(33%)	10(25%)		0.492
Single/divorced	27(77%)	30(75%)		
Median duration of illness	10 months	5 months		0.002*
<b>Exposure to sun</b>				
None	6(15%)	10(25%)		0.245
Less than 20 min three times a week	12(30%)	14(35%)		
Above than 20 min three times a week	22(55%)	16(40%)		
<b>Nutrition status</b>				
Sufficient intake of Vitamin D	25(63%)	21(53%)		0.345
Insufficient intake of Vitamin D	15(37%)	19(47%)		
CGI (mean ±SD)	2.33±0.88	5.88±0.86		0.0001*
PANSS total (mean±SD)	53.54±11.09	114.30±19.20		0.0001*

Table 2: The correlation between serum total vitamin D level and clinical outcomes.

	r	Significance
CGI-S	-0.654	0.000*
PANSS total	-0.567	0.000*
P (mean)	-0.365	0.000*
N (mean)	-0.562	0.000*
G (mean)	-0.543	0.000*

## DISCUSSION

The current research was planned to define the vitamin d role as adjuvant therapy of hypovitaminosis d in patients of schizophrenia. We had observed in our findings that vitamin D deficiency is significantly related/ associated to the disease activity in patients with schizophrenia. The deficiency can easily be seen all the schizophrenia

patients. This finding is supported by other published findings [Belvederi Murri *et al.* 2013; Itzhaky *et al.* 2012; Jamilian *et al.* 2013]. We observed in our findings that patients in Group B has poorer serum total vitamin D concentration in comparison to the group A patients, an inverse association is observed among the concentrations of the total vitamin D and activity of the disease. The earlier statement is constructed on estimated CGI-S and PANSS scores. Although very few studies highlighting the vitamin D role in schizophrenia patients, but we may mention three studies and one adolescent which is based upon the vitamin D serum concentrations and of the psychotic symptoms severity. Another cross-sectional study conducted by Berg *et al.* 2010 reported the correlation as negative between the concentrations of vitamin D and the psychomotor activity, physical energy and somatic

objections [Berg *et al.* 2010], on the other hand the study conducted by the Itzhaky *et al.*, testified no correlation among PANSS scores and the vitamin D concentrations [Itzhaky *et al.* 2012]. Another study enhancing the association experience were UK based and published by Crews *et al.* 2013. Similar to our findings the earlier mentioned study highlights the significant role of lower vitamin D concentrations in serum among the first episode psychosis patients but it lacks the association with severity of illness. Another useful thought may appear here to the evaluation the sampling methods of other referenced or published studies. If the grouping of patients were as of it to our study, this might produce the similar disease activities. That's why we have designed two groups of patients that were entirely different in the reactivates of the disease. Conversely, in the aforesaid study, the entire patients were having acute episodes. Our study findings reported that all patients with schizophrenia and of control group possess low total serum vitamin D concentration. Apart from the country location as of at apposite latitudes for vitamin D synthesis [Amato *et al.* 2010] therefore it is expected with the total vitamin D higher levels as of projected. We reported similar total serum vitamin D concentration among group B and C. This might be due to the inclusion of controls which already available in hospital with other diseases, so not presenting the actual health population of the country. When it comes to schizophrenic patients, mainly in the group B, t severe vitamin D paucity was observed though the vitamin D synthesis vital factors including the sex, sunlight exposure and the nutrition were analogous in both groups. This outcome might insinuate the presence of an anonymous contact among total vitamin D serum concentration and the disease activity. The fall of levels of vitamin D in group B may highlight its role as of its less concentration may cause the acute episode. This may further require or open the dimensions at genetics level. One Italian published study in 2010 had observed and reported the overlap of 70 genes among schizophrenia and vitamin D related genes as significant.

## CONCLUSIONS

We may conclude that the vitamin d role as adjuvant therapy of hypovitaminosis d in patients of schizophrenia is very vital and well demonstrated by our study.

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