

**A COMPARATIVE STUDY OF VITAMIN D LEVELS IN INDIVIDUALS
WITH AND WITHOUT DEPRESSION**

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ABSTRACT

Aims

Depression is a universal health problem and its outcomes are physical, psychological and social. Several studies have shown that depression results in decreased Vitamin D values. The purpose of this study is to find out the association between the levels of depression and 25-hydroxyvitamin D levels in individuals and to compare the same between individuals with and without depression.

Methods

This prospective study was carried out as part of a doctoral research from January 2012 to February 2014. Both males and females in the age group 25 – 35 years were included in the study. Beck's depression inventory (BDI) was used to assess depression. Individuals, who scored greater than 14 points with BDI, comprised the Study group. The normal group comprised of individuals who scored less than 14 points with BDI. Vitamin D levels were evaluated in both the group.

Results

A total of 65 individuals were included in the study group. (33 Males/32 Females). Their mean Beck's score was 24.5 ± 4.79 . There were 63 in the normal group (51 Males/12 Females). Their mean BDI score was 3.52 ± 2.35 . Mean Vitamin D3 value in the depressed group was 10.7 ± 3.09 whereas in the normal group, it was 15.07 ± 7.99 . The difference was statistically significant ($p < 0.00$).

Conclusion

This study shows that Vitamin D levels are significantly low in depression. The negative correlation in the study group reveals that the Vitamin D levels decrease as depression increases.

Key words - Depression, Vitamin D, mental health, Beck's Score

Introduction

The human body responds to the way, a person thinks, feels and acts. This is called the "mind - body connection". When an individual is depressed, stressed or anxious, the same may be indicated by physical symptoms - back pain, change in appetite, bowel disturbance, extreme tiredness, high blood pressure, troubled sleep, palpitations, weight gain or loss – to name a few.

Depression is one important health issue; however, many people with depression go undiagnosed (1,2). According to the World Health Organization (WHO), Depression is a mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness and poor concentration. (3) The depressive disorders are grouped under a category in the DSM-IV (Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition) called Mood Disorders (4). It is estimated by 2020, if current trends for demographic and epidemiological transition continue, the burden of depression will increase to 5.7% of the total burden of disease and it would be the second leading cause of disability-adjusted life years (DALYs), second only to ischemic heart disease (5). In view of the morbidity, depression has always been a focus of attention of researchers in India. Various authors have tried to study its prevalence, nosological issues, psychosocial risk factors including life events, symptomatology in the cultural context, comorbidity, psychoneurobiology, treatment, outcome, prevention, disability and burden.

Understanding depressive disorders and its relationship with clinical features and quality-of-life dysfunction may suggest new directions to improve treatment interventions and may facilitate more appropriate allocation of health care resources (6).

Biochemical correlates of Depression

Biological causes of clinical depression continue to be studied extensively. The exact etiology of depression is yet to be determined; however, it has been proposed that multiple factors, including biological, psychological, and environmental factors are involved in the presentation of depression. Many biochemicals have been linked to depression like Vitamin D, Cortisol, cholesterol, thyroid hormones, norepinephrine, dopamine etc.

Increasing research is being done on Vitamin D deficiency over the past decade. Intensive research on vitamin D is being performed in all areas of medicine (7).

Several studies have shown that low Vitamin D levels are associated with depression (8,9).

The objective of the study was to investigate the association between depression and Vitamin D levels and to compare the levels between individuals with or without depression.

Methods

This study was an open, parallel, prospective, concurrent-control group study conducted as part of a doctoral research work. Individuals for the study group were recruited from a prominent yoga centre in Chennai. The study was conducted from January 2012 to February 2014. Approval from Institutional Ethics Committee was obtained before the commencement of recruitment. The study was explained in detail to all the prospective participants. Following this, the individual was requested to give written informed consent. Throughout the conduct of the study, the privacy of participants was protected. All data were only identified by a unique identification number and initials.

Males and females, aged 25 to 35 years with Beck's Inventory scores ≥ 14 were included in the study. Patients were excluded if they were not in the specified age group or had any other illnesses, significant memory/perceptual/behavioural disorder. The participants were not on any medicines or any other therapy. Pregnant women were not included in the study.

The Normal group comprised of willing individuals who were 'not depressed' as assessed by Beck's inventory (Beck's scores < 14). Both the groups, after completing the Beck's inventory, underwent blood test for Vitamin D evaluation.

Blood samples were collected after overnight fasting, centrifuged and Vitamin D was estimated using chemiluminescent immunoassay technology.

Beck's Depression Inventory (BDI)

BDI was created by Aaron T. Beck. It is a 21-question multiple-choice self-report inventory, one of the most widely used instruments for measuring the severity of depression. The questionnaire is designed for individuals aged 13 and over, and is composed of items relating to symptoms of depression such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex (10). Each question has a set of at least four possible answer choices, ranging in intensity. A BDI total score of ≤ 13 is considered to be within normal range, a score of 14–19 shows mild depressive state, a score of 20-28 is moderate and 29-63 is severe depression (11,12)

Results were analyzed for changes in Vitamin D levels with respect to depression. Student's independent sample t-test was used to compare the differences in scores between two groups. Data were analyzed using SPSS v.17.0.

Results

There were 65 individuals in the study (depressed) group, out of which 32 were males and 33 were females. Their mean Becks Score was 24.65 ± 5.69 .

There were 63 individuals in the normal group out of which 51 were males and 12 were females. Mean age was 29.67 ± 3.22 . Their mean Becks Score was 3.52 ± 2.34 (Figure 1).

Relative to men, women demonstrated higher depression scores, though the difference was not statistically significant ($p=0.19$).

We compared the Vitamin D levels of the depressed individuals with normal individuals who were not depressed against their Becks scores.

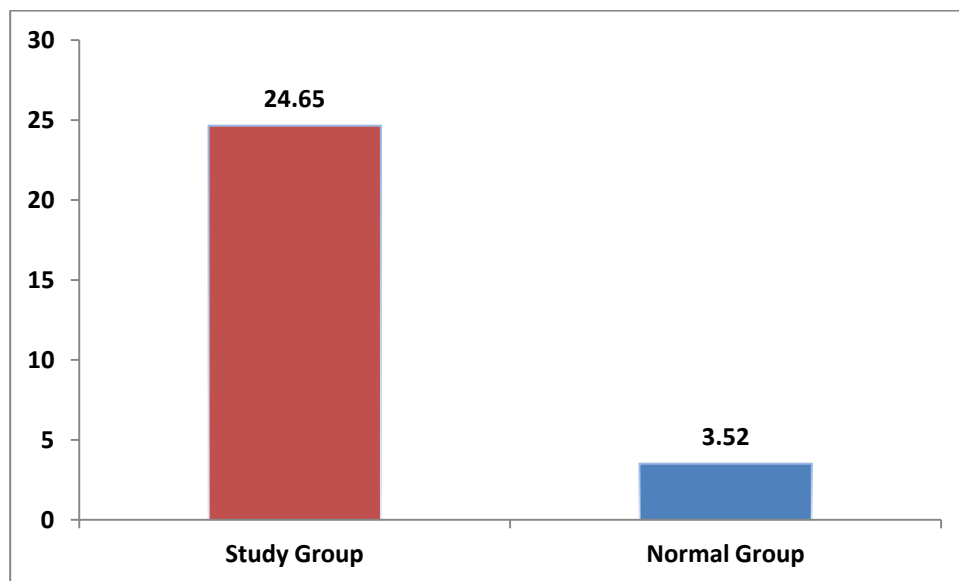


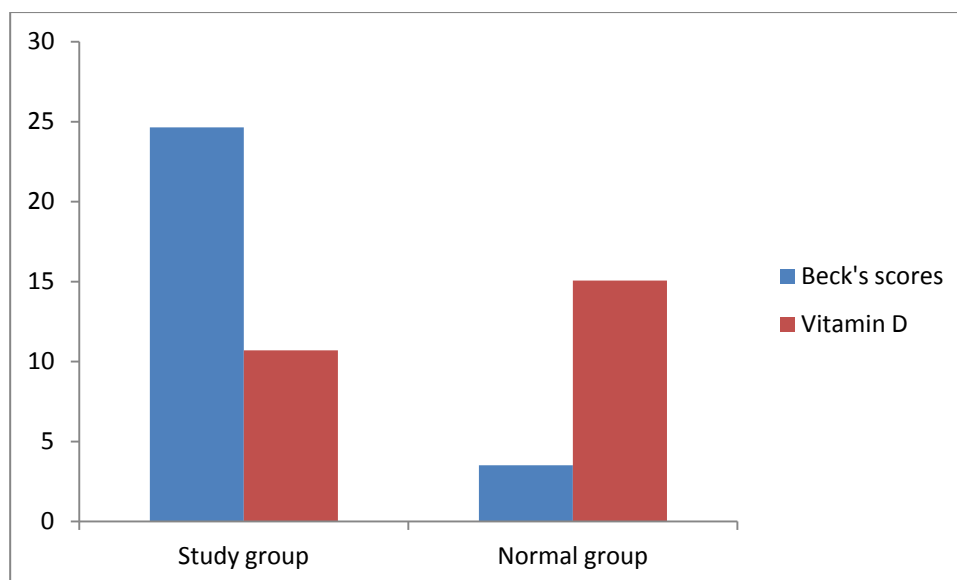
Figure 1: Comparison of Depression scores between Study Group and Normal Group

Levels of Vitamin D in the normal group was 15.07 ± 7.99 , whereas in the the depressed group it was 10.7 ± 3.09 ng/ml. The difference was extremely significant. Students t test revealed a p value of $p < 0.0001$.

Table 1: Demographics of Study participants

	Study group	Normal group
Age	29.14 ± 3.16	29.29 ± 3.61
Gender	32 males / 33 females	51 males / 12 females
Beck's scores	24.65	3.52
Vitamin D	10.7 ± 3.09	10.7 ± 3.09

Figure 2: Depression scores vs Vitamin D levels in both the groups



Discussion

Depression is a multi-dimensional disorder. It has biological components based in genetics, neurochemistry and physical health, it has psychological components that involve many individual factors such as cognitive style, coping style, and qualities of personal behavior. Unravelling the mechanisms behind depression is both difficult and exciting.

Studies of brain chemistry and of mechanisms of action of antidepressant medications continue to inform the development of new and better medical and psychotherapy treatments. There is a high degree of variation among people with depression in terms of symptoms, course of illness, and response to treatment, indicating that depression may have a number of complex and interacting causes. This variability poses a major challenge to researchers attempting to understand and treat the disorder. However, recent advances in research technology are bringing scientists closer to characterize the biology and physiology of depression in its different forms and to the possibility of identifying effective treatments for individuals based on symptom presentation. (13)

Studies have shown that low Vitamin D levels are associated with depression and improvement in depression is significantly associated with increased Vitamin D levels (8,9). Similarly in our study, we found that Vitamin D3 was less in the study (depressed) group compared to the normal group.

In a case report series presented at The Endocrine Society's 94th Annual Meeting in Houston, authors concluded that correction of the patients' underlying shortage of vitamin D might be responsible for the beneficial effect on depression. Vitamin D may have an effect on mood, and its deficiency may exacerbate depression (14).

A research, completed by UT Southwestern Medical Center in 2011, (15) positively confirmed the previous studies' outcomes on association between low levels of vitamin D and depression. People with the lowest levels of vitamin D were more likely to report symptoms of depression, compared to people with higher blood levels of vitamin D.

It is also likely that depressed people may spend more time indoors, and are less likely to eat a healthy diet and take care of themselves, all of which could affect vitamin D levels. On the other hand, there are vitamin D receptors everywhere in the body, including the brain. These receptors need vitamin D to do their job.

Based on the proposed explanations, Vitamin D may affect neurotransmitters, inflammatory markers and other factors, which could help explain the relationship with depression. Vitamin D also may reduce the production of cytokines. Cytokines are proteins that increase inflammation and have been shown to be a possible risk factor for depression. One of the effects that vitamin D has on the brain is to improve serotonin levels, which is the same chemical that many antidepressants act on. Vitamin D is believed to play a role in maintaining the brain's signaling pathways and reducing inflammation. Not enough D and inflammation degrades brain cells in a way that leads to depression symptoms (16)

In another study (17), serum levels of vitamin D in schizophrenics, depressed patients and healthy subjects were compared in an Iranian population. This study showed that vitamin D level in healthy participants was significantly higher than depressed patients.

Conclusions

Findings of this study show that Vitamin D3 levels were low in depression. This study provides information on an important biochemical parameter as marker for depression, thereby providing inputs to guide clinical practice for Depression.

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