Review Article

The Missing Vitamin in Humans! The Impact of Vitamin D Deficiency on Mental Health in Adolescents: A Cross-Sectional Study

Abstract:

Are you talking about vitamin D or illness?

Psychiatric illnesses are in their own right a complex constellation of factors that shape an individual's mental health. (It is better to insert it at the beginning} Vitamin D has been reported in the scientific press as a crucial factor that has significant health benefits in the prevention and treatment of countless chronic illnesses, including mental health. Vitamin D is critical not only for bone health but also for suitable brain development and functioning. Most individuals worldwide have insufficient levels of vitamin D. Not only are adults affected, but adolescents are also predisposed to this deficiency. This is also true for individuals with mental health disorders. Low levels of vitamin D are directly correlated with depression, schizophrenia, seasonal affective disorder, and cognitive dysfunction. Adolescents were studied to investigate the relationship between low levels of vitamin D concentrations and mental health conditions, including psychosis,and to report on the current knowledge about the assessment and treatment of vitamin D deficiency in relation to mental health.

Keywords: *Psychosis, mental health, depression, schizophrenia, cognitive dysfunction, vitamin D deficiency, seasonal affective disorder*

Introduction:

Vitamin D deficiency is an endemic condition affecting diverse populations worldwide. Factors responsible for this deficiency include lack of sun exposure and deficient levels of dietary intake.Individuals with darker skin tones or of Latino origin are more susceptible to low levels of vitamin D. Studies suggest that approximately one billion people worldwide are afflicted by vitamin D deficiency and nearly 50% of the global population has vitamin D insufficiency. Appropriate levels of vitamin D are important in the prevention of osteoporosis and rickets disease. In addition,vitamin D is vital for intestinal calcium absorption and skeletal development. Although there is a plethora of data indicative of the benefits of vitamin D on bone health, the role of vitamin D deficiency in psychiatric populations is greatly understudied.According to the Clinical Practice Guidelines from the US Endocrine Society, vitamin D deficiency is defined as serum levels of 25-OH D varying between 50-70 nmol/l.

Vitamin D also acts as a catalyst in mental health and cognitive functions. The feasibility of the role of vitamin D in psychiatric disorders is proposed in the region-distinct expression of vitamin D receptors (VDR) within the cingulate cortex, cerebellum, thalamus, amygdala, hippocampus, and substantia nigra. For instance, the amygdala is associated with the regulation of behaviors and emotions. These regions indicate 1 alpha-hydroxylase enzyme is capable of metabolizing 25(OH)D to 1,25(OH)2D3, which conveys the likelihood for vitamin D to present an autocrine and paracrine action in the brain. Research has shown that vitamin D has a vital role in the pathophysiology of mood disorders and other mental health issues. Studies have demonstrated that the upregulation of proinflammatory cytokines in the brain is correlated with major depressive disorder (MDD).Additionally, vitamin D deficiency is also associated with neuropsychiatric conditions like Parkinson's disease, multiple sclerosis (MS), Alzheimer's disease, schizophreniform disorder, and autism spectrum disorders. Low levels of vitamin D have also been found to be directly linked to schizophrenia.

The primary cause of vitamin D deficiency in patients with psychiatric illness is low exposure to sunlight and dietary insufficiency. Vitamin D levels should be included in the assessment of psychiatric patients presenting with depression as a direct correlation exists between the two. One study conducted in the United Kingdom demonstrated that 100% of psychiatric male patients were vitamin D deficient during hospitalization. Two randomized controlled trials (RCT) have demonstrated that increasing vitamin D levels through supplementation with Vitamin D3 orally in individuals with vitamin D deficiency who have been diagnosed with MDD has reduced their depressive states and improved their mood. One of the studies investigated the relationship between phototherapy and vitamin D supplementation for seasonal affective disorder (SAD) and results yielded a positive effect for vitamin D through supplementation or phototherapy within a one-month period. The second study in overweight depressive subjects with low levels of vitamin D found that supplementation of vitamin D resulted in compelling improvement of mood and depression after a one-year period.

The purpose of this study is to determine if individuals with MAD and acutely mentally ill adolescents in inpatient units have higher levels of vitamin D insufficiencies compared to the general US population. In addition, it is hypothesized that lower levels of vitamin D are directly analogous with the severity of mental illness as defined by the presence of psychiatric features.

Methods:

The study took place at the Strong Behavioral Health Child and Adolescent Acute Inpatient Service or Partial Hospitalization Services (CAPHS), Department of Psychiatry at the University of Rochester in New York City over a 16-month period. The adolescents were between 12 to 18 years old of varying races and included 75 females and 29 males. Participants had serum 25-OH vitamin D levels that were low on laboratory testing. Consent forms were collected from participants or legal guardians for participation. Clinical DSM-V diagnoses were primarily affective disorders ranging from MDD, mood disorders, ADHD, bipolar disorder, and psychiatric disorders. Participants were selected through a clinical admissions database who upon admission presented with psychotic symptoms ranging from paranoia, delusions, or

hallucinations as documented by the emergency room psychiatrist on duty. Vitamin D 25-OH levels were collected and analyzed under immunoassay and the results were recorded as normal, insufficient, or deficient. Normal levels were indicative of levels above 30 ng/ml, insufficient levels were indicative of 20-30 ng/ml, and deficient levels were indicative of less than 20 ng/ml based on national guidelines. The results from the 104 participants were collected and evaluated using an ANOVA t-test analysis. The correlation between vitamin D levels and psychosis was measured using a logistic regression model.

Results:

The results demonstrated that 33% of the adolescent participants demonstrated they were vitamin D deficient while 40% demonstrated they were vitamin D insufficient. Of the 33% that were found to be vitamin D deficient, 40% portrayed psychotic features in comparison to the 16% who were not vitamin D deficient. The hypothesized theory of the study demonstrated that those with vitamin D deficiency are 3 ½ times at greater risk to have psychotic comorbidities. Those participants with normal vitamin D levels did not display any psychotic features. In reference to race, those who were of darker skin tones or Latino origin were more likely to display vitamin D deficiency with psychotic features.

Implications for Future Research in Psychiatry:

Future research and studies on the relationship between vitamin D deficiency and mental illness could have a colossal impact on understanding the root cause of the psychotic features in individuals with subpar levels of vitamin D. Educating physicians and practitioners to obtain vitamin D levels in routine laboratory testing in individuals displaying mood disorders, psychotic features, and MAD is critical for proper diagnosis. More times than not, psychotic features have a root cause that is non-psychiatric related such is the case with low levels of vitamin D. More studies are needed in this niche in order to better understand how vitamin D affects those regions in the brain responsible for mood disorders and neurocognitive functions. While this study was indicative that a correlation exists between vitamin D deficiency and psychotic features, the work is limited to a small sample size and therefore more studies of a larger scale are essential with a more rigorous design.

Conclusion:

Vitamin D deficiency is profoundly common in this study of adolescents with psychotic features. This study confirms other studies performed in adult populations with similar symptoms and findings. Potential trials of vitamin D supplementation are deemed necessary to address the mental health discipline in D-deficient mentally unstable adolescents and adults with a concentration on dose-finding and tolerability. More randomized trials of vitamin D deficiency in individuals with mental health issues should be implemented.

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