

# Vitamin D and depression... is there an association?

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## Abstract

In this paper, we looked into the effect vitamin D supplementation has on depressive symptoms in different populations. We found that, despite the existence of clear evidence towards the hypothesis, the number of solid studies (meta-analyses) on the topic were rather few and did not cover all populations. With this article, we aim to make it perfectly clear that there exists a need for far more research on the topic. At least 1 study showed that vitamin D had no effect on depressive symptoms, which also necessitates further research. Furthermore, nations, such as the republic of the Sudan, need to establish 'normal' vitamin D levels in their populations. This is also meant to urge such researches into taking place.

Keywords: Vitamin D; Depression; Major Depressive Disorder; MDD; VD; Public Health Institute; Napata College; Sudan

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## 1. Introduction

It is of immense importance that we focus on the prevention of mental disorders in younger individuals, especially given the fact that the first onset of mental disorders first becomes manifest in childhood and adolescence (1). Furthermore, there is clear evidence for poor detection rate of mental disorders (namely mood and anxiety disorders) in general (2).

Despite the plethora of advances the world of medicine has been subject to, it is still rather apparent that a number of issues exist regarding the detection and treatment of Major Depressive Disorder (MDD), with rates of misdiagnosis reaching a staggering 65.9% (2). MDD is a neuropsychiatric illness characterized by a number of symptoms, including, but not limited to, reduced self-esteem, fatigue and anhedonia; it is usually far more prevalent in women when compared to men (3). Depressive disorders are, as aforementioned, rather common; with at least 300 million people affected by them and are the world's third leading cause of disability (4). There is also reasonable reason to believe that the economic changes that have affected the world (and all that has occurred as a result of it including, but not limited to, nutritional changes) inadvertently resulted in an increase in rates of depression worldwide (5).

## 2. The importance of vitamin D:

Classified as a secosteroid/neurosteroid hormone, which have been classified as a neuroprotective factor as well as a contributor to neurological development (6–8). The association between vitamin D and ultraviolet rays has become well-established in both the scientific and public culture; in fact, it is, in some instances, referred to as the 'sunshine vitamin' (9). This synthesis is dependent on a number of factors, such as amount of skin exposure to the sun and season (10). It has long been established that vitamin D plays a role in the homeostasis of calcium and phosphate (11). Furthermore, its role in cell growth, immunological and

neuromuscular function (11).

Sources of vitamin D vary, examples include, cold-water fish, plants, and animals; however, dietary sources represent only a small percentage of vitamin D that is metabolized (12,13). There are a number of nutritional sources of vitamin D and its different components; these include, vegetables and herbs as a source of VD<sub>2</sub> and white meat and fish as a source for VD<sub>3</sub> (5).

There seems to be reasonable cause to claim the existence of genetic factors as role players in the modulation of vitamin D levels; however, the same meta-analysis found that the primary determinants to vitamin D levels were environmental factors (14).

### 3. Association between vitamin D and depression:

There is an ever-increasing wave of evidence suggestive of a correlation (and possible causation) between dietary status and mental disorders(15). Despite the existence of a rather sufficient number of observational studies, there exists a relative lack of interventional studies in the subject of the association between vitamin D and MDD (16).

In regards to RCTs regarding the topic, there, unfortunately, exist none discussing the association between vitamin D levels and the existence of mental disorders in the child and adolescent population (16–18).

When discussing the adult population, however, the RCTs looked into the effect of supplementation on pre-existing depression; the results were contradicted by meta-analyses of studies(16,19–21).

A number of these observational studies have arrived at the same finding; that is, they confirm an association between 25 (OH) vitamin D (which is the recommended biomarker for vitamin D analysis) and depression (22–24).

As per Casseb and colleagues ‘The deficiency of vitamin D is highly prevalent throughout the world and has been suggested to be associated with an enhanced risk of major depressive disorder (MDD)’ (11). This point, illustrated in this work and others, has resulted in the rising of a speculation of vitamin D and depression being somehow correlated.

A meta-analysis published in 2018 concluded that vitamin D oral supplementation was found to be favorable in their effect towards major depressive disorder (MDD), ergo, making it logical to conclude that a correlation (and possible causation) exist between the two (25).

A 2020 appraisal looking into the same issue determined that despite the existence of a correlation, the evidence was not strong enough to recommend the universal implementation of supplementation into the treatment protocol of depression (26).

In regards to child and adolescent patients, there seems to be no effect of vitamin D on reported levels of depression (27).

When discussing antenatal and post-partum depression (AD and PPD, respectively), it seems as if there is an association between vitamin D status and AD and PPD (28).

Furthermore, there also seems to be an association between maternal vitamin D status and pregnancy and neonatal complications (29).

Despite the above data, at least one 2020 paper clearly states that vitamin D supplementation, despite having an effect on anxiety symptoms, has no effect on depressive symptoms(30). The interventional period in this study was 6 months.

### Conclusion:

In conclusion, a number of studies have observed an increase in vitamin D levels resulting in it reaching

‘normal levels correlating with a decrease in depressive, anxious, and mood-related disorders (8).

#### 4. Recommendation(s):

- 1) Increasing the number of systematic reviews regarding the topic
- 2) Increasing the number of RCTs in both the adult and pediatric populations
- 3) Spreading this data to clinicians so that they can be considerate of vitamin D whenever they are dealing with their patients.
- 4) The allocation of considerable funds towards the research of the psychiatric effects of vitamin deficiencies.
- 5) Establishing ‘normal’ vitamin D levels per population via further research.

#### 5. Abbreviations (in alphabetical order):

AD = Antenatal Depression

MDD = Major Depressive Disorder

PPD = Post-Partum Depression

RCT = Randomized Controlled Trial

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