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## The Role of Vitamin C in the Treatment of Depression

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### Dear editor

Some studies have suggested that vitamin C deficiency may play a role in the etiology of depression although the efficient dose and time of prescription is not clear now. Also, it is not known which antidepressant drugs could be more efficient in augmentation with vitamins. Nowadays, due to the importance and more prevalence of psychiatric disorders, dietary supplements which would augment the effects of drugs have been taken into consideration. Moreover, dose titration of antidepressant drugs is a lifelong challenge due to unwanted side effects.

Long time ago, it was introduced a disease called Scurvy, which is caused by vitamin C deficiency in malnourished individuals. It has some presentations like melancholia, cognitive impairment, and organic problems. Vitamin C is an antioxidant soluble vitamin that has an important

effect on regulation, modulating, synthesis and releasing of neurotransmitters and myelin formation. It is also a cofactor for dopamine beta hydroxylase in converting dopamine to noradrenaline. Vitamin C also has a role in regulating glutaminergic and dopaminergic system. It takes part in releasing catecholamines and acetylcholine from synaptic vesicles in synaptic cleft. One of the key features of this antioxidant is to prevent excessive secretion of glutamate, which could have a toxic effect.

The direct or indirect effects of vitamin C on mood disorders or other emotional dysregulation and disturbance are not known. Moreover, it is not known whether or not it has psychiatric unfavorable drug interactions and if its effects depend on gender or age of the patients. In a study about vitamin C and depression, there was no significant effect of

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vitamin C on depression symptoms in menopause women who took this vitamin as an adjuvant with antidepressant drugs (Jokar and Farahi, 2014). In other study, it has been demonstrated that having kiwi fruit twice a day improves symptoms in patients with depression. It is important to regularly use these types of fruits every day to decline risk of depression (Carr *et al.*, 2013). Plasma vitamin C concentration was inversely correlated with total mood impairment, anger, and confusion in young male students with depression and high vitamin C condition declined depression score (Pullar *et al.*, 2018). Amr *et al.* demonstrated a positive effect of the vitamin in a combination therapy with fluoxetine on depressive symptoms (Amr *et al.*, 2013). On the other hand, in another study, adding vitamin C to citalopram was not effective on depression and suicide (Sahraian *et al.*, 2015). It seems that different questionnaires and other characteristics such as age, gender, smoking, socioeconomic status, sample size, time of follow up, severity of depression or existence of other medical illnesses, such as gastrointestinal disorders may have a role in discrepancies of results. It has been recommended in a systematic review to measure serum level of vitamin C in resistant psychiatric patients. It seems that this vitamin has significant roles in some brain areas such as cortex, hippocampus and amygdala and it has important effects on mood, cognition, and memory (Plevin and Galletly, 2020).

Vitamin C deficiency associated with low degree of mentality. Attentional focus and work drive will be increased with vitamin C augmentation. Sustained attention and concentration as cognitive tasks will be better, too. Of course it may not be significant relationship between serum concentration of vitamin c and self-regulation and depression (Sim *et al.*, 2022).

There is a challenging issue that whether or not vitamin C could play a role as an antidepressant drug and elevate mood in normal population; and which antidepressant drug has a better effect in combination with vitamin C. Finally, how long and how much of this antioxidant must be used to have its useful outcomes, and whether using supplement instead of natural sources such as fruits and

vegetables could take part in changing mood or not. Based on multiple studies, established effects of vitamin C in treating depression have been explained. Prescribing supplement as an adjuvant to antidepressant drug may have potential effects instead of using natural resources. Due to recent pandemic and current advice of using vitamin C, and also its low possibility of toxicity, this vitamin has been a good choice in combination with antidepressant drugs. Today's current socioeconomic status issues have caused an increase in psychiatric problems such as anxiety and depression.

According to potential positive effects of vitamin C in treatment of depression and its low cost and rates of side effects, it could be prescribed as tablets, capsules, effervescent tablets or powders to treat patients. It would be also an alternative choice to use natural resources of the vitamin C like fruits (orange, pineapple, and mango) or vegetables (cabbage, turnip, scallion, parsley, basil, coriander and spinach). There might be a need to have a guideline for prescribing this antioxidant and the best way to follow up the patients.

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