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Association between Prenatal Vitamin D Status and Antenatal-Postpartum Depression

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ABSTRACT

Depression during and after pregnancy are the main cause of disease-related disability among women. Antenatal depression and postpartum depression are common, with a prevalence of 18% and 19%, respectively. Depressive symptoms during and after pregnancy are related with unfavourable outcomes for mothers and their newborns. Even though, biological, psychological, and environmental theories of depression have been advanced, the underlying pathophysiology of depression remains unknown, and several different mechanisms are probably involved. Vitamin D has been involved in antenatal depression and postpartum depression in many researches. This literature review aims to describe the associations between prenatal vitamin D and antenatal- postpartum depression.

1. Introduction

Postpartum depression (PPD) is a mental health condition occurring after childbirth characterized by emotional disturbance and behavioural changes. It is expected that 20% of American women experience symptoms of magnitude and duration to meet the criteria for PPD. A recent meta-analysis placed rates of diagnosed PPD higher in overweight and obese pregnant women. Depression after childbirth results in maternal suffering, more likelihood of parenting ineffectiveness, and possible difficulties for the entire family. Therefore, it is advantageous to increase our understanding of the risk factors, aetiology, and mechanisms of depression in women following birth. Independent risk factors include prenatal depression, high life stress, low social support, and low education.¹

Vitamin D is a unique neurosteroid hormone required for normal brain homeostasis and development. Vitamin D₃ is produced in the skin when

exposed to the sun's ultraviolet rays and is also absorbed from various food sources, such as oily fish. Low levels of vitamin D have also been associated with several mental disorders, including depression. According to a recent meta-analysis of 31,424 males and females, vitamin D is inversely associated with depression; however, none of the included studies was on pregnancy or postpartum. A prospective study of 796 women found a negative association between prenatal vitamin D levels at 18 weeks gestation and PPD symptoms. Another recent prospective study reported lower maternal 25(OH)D₃ levels in the second trimester of pregnancy were associated with higher PPD symptoms at one week, six weeks, and 6 months postpartum. Cross-sectional studies have also been published in support of these prospective ones. Thus, the more extensive literature on low vitamin D levels and depression have been extended into pregnancy

and postpartum. To our knowledge, no studies have investigated the combined effects of prenatal vitamin D status and inflammatory markers on PPD symptoms in any ethnic group.¹⁻²

Depressive symptoms during and after pregnancy are the leading cause of disease-related disability among women. Antenatal depression (AD) and postpartum depression (PPD) are common, with a prevalence of 18% and 19%, respectively. Depressive symptoms during and after pregnancy are associated with unfavourable outcomes for mothers and their infants; AD and PPD have been related to children's poor cognitive development, behavioural effects, and mental and physical health.¹⁻⁴

Although biological, psychological, and environmental theories of depression have been advanced, the underlying pathophysiology of depression remains unknown, and several different mechanisms are probably involved. Studies have shown the beneficial effect of dietary factors on depressive symptoms during pregnancy. Vitamin D is one of those nutritional factors and has been suggested to affect depression in adults beneficially. It has been hypothesized that vitamin D may act as a neuroactive hormone. Several studies have shown that vitamin D receptors are broadly distributed throughout the human brain, and its deficiency alters neurotransmitters that are known to be involved in depressive symptoms. Most recently, it has been postulated that vitamin D modulates neuronal calcium ions (Ca²⁺) levels that are responsible for the onset of depressive symptoms.⁵⁻⁹

Conversely, a deficiency of vitamin D may increase neuronal Ca²⁺, thus increasing depression. In addition, vitamin D may play a role in neuro-immunomodulation and neuro-plasticity, both proposed mechanisms for the observed effect on mood. Several studies have investigated the association between blood concentration of 25-hydroxyvitamin D (25(OH)D, the vitamin D metabolite that is the best indicator of vitamin D status in the general population and pregnancy mood disorders.¹⁰⁻¹⁴

Vitamin D supplementation may be a simple way

to reduce the risk of these adverse outcomes. One RCT showed that supplementation with 2000 IU/day of vitamin D during pregnancy reduces the risk of antenatal depression. This suggests that low levels of 25(OH)D may be a modifiable risk factor in pregnancy. Health care providers should at least encourage pregnant women to follow current guidelines on recommended daily allowances for vitamin D.¹⁵⁻¹⁷

Several mechanisms may explain the observed association between 25(OH)D concentration and risk of depression in pregnancy. Depression is associated with dysregulated hypothalamic-pituitary-adrenal axis function, overactivity of the sympathoadrenal system, an increased level of inflammatory markers. Vitamin D has been shown to down-regulate inflammatory mediators that have been linked to sickness behaviour, psychosocial stress, and depression. Vitamin D may also have direct neuroregulatory activity. Vitamin D receptor (VDR) gene polymorphisms in humans have been associated with cognitive impairment and depressive symptoms. In addition, systematic reviews of epidemiological studies have shown that a lower concentration of 25(OH)D is correlated with an increased risk of depression in adults.¹⁸⁻²⁰

2. Conclusion

There may be an association between lower vitamin D status and increased risk of depressive symptoms during and after pregnancy. These findings provide the first evidence that, together, low prenatal 25(OH)D and high prenatal inflammation might predict future postpartum depressive symptomatology in women. These results may therefore elucidate inflammatory moderators linking vitamin D status to depressive symptoms, not only in pregnancy, but potentially in other subgroups of the population. Future research on the synergistic relationship of 25(OH)D and inflammation on depression is worthwhile. Understanding how vitamin D alters the immune system may shed new light on the emerging links between inflammation and depression.

3. References

1. Dave, S., Peterson, I., Sherr, L., Nazareth, I. Incidence of maternal and paternal depression in primary care: A cohort study using a primary care database. *Arch. Pediatr. Adolesc. Med.* 2010; 164: 1038–1044.
2. Wang, J., Williams, J., Lavorato, D.; Schmitz, N., Dewa, C., Patten, S.B. The incidence of major depression in Canada: The National Population Health Survey. *J. Affect. Disord.* 2010; 123: 158–163.
3. Gavin, N.I., Gaynes, B.N.; Lohr, K.N., Meltzer-Brody, S., Gartlehner, G., Swinson, T. Perinatal depression: A systematic review of prevalence and incidence. *Obstet. Gynecol.* 2005; 106: 1071–1083.
4. O'Hara, M.W., Wisner, K.L. Perinatal mental illness: Definition, description and aetiology. *Best. Pract. Res. Clin. Obstet. Gynaecol.* 2014; 28: 3–12.
5. Letourneau, N.L., Dennis, C.-L., Linder, J.; Cosic, N. The effect of perinatal depression treatment for mothers on parenting and child development: A systematic review. *Depress. Anxiety* 2017; 34: 928–966.
6. Krishnan, V., Nestler, E.J. Linking molecules to mood: New insight into the biology of depression. *Am. J. Psychiatry* 2010; 167:1305–1320.
7. Leung, B.M., Kaplan, B.J. Perinatal depression: Prevalence, risks, and the nutrition link—A review of the literature. *J. Am. Diet. Assoc.* 2009; 109: 1566–1575.
8. Leung, B.M., Kaplan, B.J., Field, C.J., Tough, S., Eliasziw, M., Gomez, M.F., McCargar, L.J., Gagnon, L., APrON Study Team. Prenatal micronutrient supplementation and postpartum depressive symptoms in a pregnancy cohort. *BMC Pregnancy Childbirth.* 2013; 13: 2.
9. Sparling, T.M., Henschke, N., Nesbitt, R.C.; Gabrysch, S. The role of diet and nutritional supplementation in perinatal depression: A systematic review. *Matern. Child. Nutr.* 2017; 13.
10. Anglin, R.E., Samaan, Z., Walter, S.D., McDonald, S.D. Vitamin D deficiency and depression in adults: Systematic review and meta-analysis. *Br. J. Psychiatry* 2013; 202: 100–107.
11. Shaffer, J.A., Edmondson, D., Wasson, L.T., Falzon, L., Homma, K., Ezeokoli, N.; Li, P., Davidson, K.W. Vitamin D supplementation for depressive symptoms: A systematic review and meta-analysis of randomized controlled trials. *Psychosom. Med.* 2014; 76: 190–196.
12. Li, G., Mbuagbaw, L., Samaan, Z., Falavigna, M.; Zhang, S., Adachi, J.D., Cheng, J., Papaioannou, A., Thabane, L. Efficacy of vitamin D supplementation in depression in adults: A systematic review. *J. Clin. Endocrinol. Metab.* 2014; 99: 757–767.
13. Berridge, M.J. Vitamin D and depression: Cellular and regulatory mechanisms. *Pharmacol. Rev.* 2017; 69: 80–92.
14. Berridge, M.J. Vitamin D: A custodian of cell signalling stability in health and disease. *Biochem. Soc. Trans.* 2015; 43: 349–358.
15. Berridge, M.J. Vitamin D cell signalling in health and disease. *Biochem. Biophys. Res. Commun.* 2015; 460: 53–71.
16. Eyles, D.W., Smith, S., Kinobe, R., Hewison, M., McGrath, J.J. Distribution of the vitamin D receptor and 1 alpha-hydroxylase in human brain. *J. Chem. Neuroanat.* 2005; 29: 21–30.
17. Fernandez de Abreu, D.A., Eyles, D., Féron, F. Vitamin D, a neuroimmunomodulator: Implications for neurodegenerative and autoimmune disease. *Psychoneuroendocrinology* 2009; 34: S265–S277.
18. Institute of Medicine. Dietary Reference Intakes for Calcium and Vitamin D; The National Academies Press: Washington, DC, USA, 2012.

19. Gould, J.F., Anderson, A.J., Yelland, L.N.; Smithers, L.G., Skeaff, C.M., Gibson, R.A., Makrides, M. Association of cord blood vitamin D at delivery with postpartum depression in Australian women. *Aust. N. Z. J. Obstet. Gynaecol.* 2015; 55: 446–452.
20. Accortt, E.E., Schetter, C.D., Peters, R.M., Cassidy-Bushrow, A.E. Lower prenatal vitamin D status and postpartum depressive symptomatology in African American women: Preliminary evidence for moderation by inflammatory cytokines. *Arch. Women Ment. Health* 2016; 19: 373–383.