

Could vitamin D3 supplementation be used as a preventive strategy in genetically predisposed breast cancer? Existing evidence and future perspective

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Madam, Breast cancer is being increasingly diagnosed at younger ages than before. Increased incidences of breast cancer at a younger age are attributed to better awareness and improvements in screening techniques. However, irrespective of early diagnosis the mortality rate remains high. While female gender, advancing age and positive family history being independent risk factors in breast cancer, association of vitamin D with breast cancer is also being explored.¹

Vitamin D, a cholesterol derived compound, is associated with maintaining and strengthening bones throughout the body and finds importance in regulating extra skeletal components and metabolic pathways; some of which may also be implicated in carcinogenesis. Vitamin D has protective functions against cancer including cell differentiation, apoptosis and anti-inflammation.² Extensive research has been conducted to associate vitamin D deficiency to an increased risk of infections, breast, colon and prostate cancer.

A study conducted in Karachi, Pakistan concluded that serum vitamin D levels were significantly lower in breast cancer patients (85.7%) than in healthy controls (55.8%).³ Thus, it is invariably hypothesized that low serum vitamin D levels (normal serum vitamin D value is 20-50 ng/ml) potentially can be associated with an increased risk of breast cancer. As previously known, breast cancer has a strong relationship with family history, a maintenance of normal vitamin D levels in such genetically predisposed cases might prevent those cases from developing breast cancer. A number of genes such as VDR, CYP27B1, CYP24A1, BCL2 family and CDH1 are expressed in normal mammary gland cells that involve vitamin D for their

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physiological functions.⁴ Disrupted expression of these genes, caused by deficiency of vitamin D is one of the important reasons for predisposition to pathways of carcinogenesis.

As vitamin D deficiency can be easily diagnosed by measuring blood levels and can be managed safely by regulating diet, adequate sun exposure and supplements, we propose to strictly monitor vitamin D levels in women whose first and second relatives have been diagnosed with breast cancer. A meta analysis also supports the intake of vitamin D supplementation to reduce breast cancer risk.⁵ We propose that strong consideration should be given to the importance of vitamin D supplementation in preventing breast cancer, particularly in genetically predisposed individuals. Long term prospective studies are, however, needed to prove the effectiveness of this proposition.

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References

1. Estébanez N, Gómez-Acebo I, Palazuelos C, Llorca J, Dierssen-Sotos T. Vitamin D exposure and Risk of Breast Cancer: a meta-analysis. *Sci Rep*. 2018; 8:9039.
2. de La Puente-Yagüe M, Cuadrado-Cenzual MA, Ciudad-Cabañas MJ, Hernández-Cabria M, Collado-Yurrita L. Vitamin D: And its role in breast cancer. *Kaohsiung J Med Sci*. 2018; 34:423-7.
3. Shaukat N, Jaleel F, Moosa FA, Qureshi NA. Association between Vitamin D deficiency and Breast Cancer. *Pak J Med Sci*. 2017; 33:645-9.
4. Carlberg C, Muñoz A. An update on vitamin D signaling and cancer. *Semin Cancer Biol*. 2020; 20:1044-579.
5. Hossain S, Beydoun MA, Beydoun HA, Chen X, Zonderman AB, Wood RJ. Vitamin D and breast cancer: A systematic review and meta-analysis of observational studies. *Clin Nutr ESPEN*. 2019; 30:170-84.