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Vitamin D role in Breast Cancer Prevention

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Abstract

Breast cancer is a significant public health problem in developing countries as it is one of the most common cancers, being the most if only the female population is considered. The occurrence is diminishing every year, which is partially due to quick detection program.

In the last decades, cellular in vitro experiments and in vivo models have evaluated the role of vitamin D in the development of breast cancer, finding a protective anticancer role of 1,25(OH)D₃ the active form of vitamin d. The evidence submits that determinations to develop vitamin D status, for instance by vitamin D supplementation and sun light exposure, might diminish cancer occurrence and mortality at low cost, with little or no adverse effects .

Keywords vitamin D, breast cancer prevention ,1,25-dihydroxy vitamin D.

Introduction

Vitamin D is a fat-soluble nutrient that's present in few nourishments, and available as a dietary supplement. It's produced in two forms, vitamin D2 and D3. Vitamin D3 form is produced from 7-dehydroxycholesterol converted to cholecalciferol in skin layers (dermis and epidermis) exposed to sunlight. It's also found in tissue, ingredient and fortified food (milk, yogurt, cheese). In contrast, Vitamin D2 (Ergocalciferol) is found in plant, mushroom and yeast.

Vitamin D induces calcium absorption inside the stomach and supports enough serum calcium and phosphate concentrations to enable normal mineralization of bone and to stop hypokalemic tetany. It's also needed for bone growth and bone remodeling by osteoblasts and osteoclasts. Without sufficient cholecalciferol, bones can become thin, brittle, or misshapen. Vitamin D adequacy prevents rickets in children and osteomalacia in adults. Besides calcium, it also helps protect older adults from osteoporosis.

It is possible that vitamin D plays a task in controlling normal breast cell growth and has the capacity to prevent the expansion of cancer cells during this location. This protective effect is believed to be largely supported by the chemo-preventive actions of 1,25(OH)₂D, or calcitriol, a well-known calcium regulator.(1)

The cancer that forms within the cells of the breasts is named breast cancer. It's the second commonest cancer diagnosed in women within the US after skin cancer. It can occur in both men and ladies, but it is more common in women. Significant support for breast cancer awareness and research funding has created advances within the diagnosis and treatment of carcinoma. Breast cancer survival rates have increased, and therefore the number of deaths related to this disease is progressively decreasing, mainly thanks to factors like earlier detection, a replacement personalized approach to treatment and a far better understanding of the disease.(2)

Both vitamin D2 and D3 are metabolized within the liver to 25-hydroxyvitamin D (25OHD) the most circulating metabolite and later within the kidney to 1,25-dihydroxyvitamin D (1,25(OH)₂D), the bioactive sort of vitamin D and therefore the vitamin D receptor ligand (VDR), through CYP27B1 (1 α hydroxylase), a mitochondrial enzyme present in proximal renal tubules. Renal CYP27B1 activity correlates inversely with calcium levels, and serum 1,25(OH)₂D concentrations are maintained within the

picomoles per liter (pmol/L) range through classical feedback mechanisms. Therefore, in normocalcemic conditions, renal CYP27B1 activity is inhibited and instead, 25OHD is metabolized by CYP24 (24-hydroxylase) to 24,25-dihydroxyvitamin D (24,25OHD), a biologically inactive metabolite that's finally converted to calcitroic acid and excreted. The discovery that epithelial breast cells possess an equivalent enzyme system because the kidney renders the effect of vitamin D on breast cancer biologically plausible.

Vitamin D can act on cancer through several mechanisms of action, which are Decrease cell proliferation, increase cell maturation and apoptosis .Suppresses the inflammation and reduce the buildup of inflammatory cells. Inhibits the renin-angiotensin system, restores the glomerular filtration barrier. Inhibits angiogenesis regulates insulin secretion and action.(3) Aim of Study this report discussed vitamin D metabolism and its mechanism of action, and will summarize the current evidence of the relationship between vitamin D and breast cancer, highlight on-going research in this area, and discuss optimal dosing of vitamin D for breast cancer prevention .

Materials and Methods

A literature search was performed to discover studies reviewing the correlation between vitamin D and breast cancer risk. Online sites and databases included in this report are PubMed database, and the American Society of Clinical Oncology for relevant reports ,National Institutes of Health (NIH). Search terms included “vitamin D”, “25-hydroxyvitamin D”, “1, 25-dihydroxyvitamin D” and “breast cancer risk” Titles and abstracts were observed for significance.

Result

As a results of several studies that have provide the connection between vitamin D and carcinoma (breast cancer) ,One of the studies showed that the medians of the pooled quintiles of serum 25(OH)D were 6, 18, 29, 37 and 48 ng/ml. Pooled odds ratios for carcinoma from lowest to highest quintile, were 1.00, 0.90, 0.70, 0.70 and 0.50. According to the pooled analysis, individuals with serum 25(OH)D of roughly 52 ng/ml had 50% lower risk of carcinoma than those with serum <13 ng/ml. This serum level corresponds to intake of 4000 IU/day. This exceeded the National Academy of Sciences upper limit of 2000 IU/day. A 25(OH)D level of 52 ng/ml could be maintained by intake of 2000 IU/day and, when appropriate, about 12 min/day in the sun, equivalent to oral intake of 3000 IU of Vitamin D. (4)

Discussion

Breast cancer may be a primary explanation for death in women. While a numeral of breast cancer risk factors are well recognized. Low circulating vitamin D levels below 30 ng/mL were found in 77% of the us population from 2000 to 2004, paralleling the amplified tendency of vitamin D deficiency within the last 2 decades. many Factors related to lower circulating 25-hydroxyvitamin D (1,25-diOH) levels include obesity, low physical activity, higher geographic latitude (marker of ultraviolet-B exposure), age, race, skin type, and smoking. More importantly, circulating 25(OH) D, the simplest marker of vitamin D status is definitely modifiable with 1000 IU of daily vitamin D intake increasing circulating 25(OH) D by 10 ng/ml.

This study showed a lower risk of carcinoma with vitamin D intake. However, this study didn't show an association between vitamin D intake and breast cancer risk. Inconsistencies among studies could also be a results of differences in methods for choosing cases and controls, dietary intake data collection tools, and referent time periods.

Optimum Dosing of vitamin D the International Organization for Migration recommended daily intake of 600 IU and 800 IU of vitamin D3 for adults aged ≤ 70 years and ≥ 70 years, individually. This was a growth from their former commendation during which nutritional allowances of vitamin D were 200 IU, 400IU, and 600IU daily for adults aged ≤ 50 years, 50–70 years, and ≤ 70 years, individually. These commendations presume some sunlight exposure and vitamin D intake from food, but aren't suitable to treat vitamin D deficiency. In overall, for every 100 IU (2.5 μg) of vitamin D3, the serum 25(OH)D level increases by ~ 1.0 ng/mL. the foremost important growths are seen in patients with the lowest starting 25(OH)D levels, but the expansion declines because the 25(OH)D concentration rises to ≥ 40 ng/mL. (5)

Conclusion

Vitamin D is vital in countless physiologic progressions. vitamin D is especially attained over UVB radiation, and deficiency as a consequence of low sunlight isn't simply adjusted by dietary intake only within the lack of supplementation. However the association between vitamin D and breast cancer remains unclear, a rising sort of research presently provisions vitamin D deficiency as a risk factor for breast cancer. strategically , randomized clinical trials are needed to further address whether or not vitamin D plays a task in breast cancer development, risk of recurrence, and survival in women with early stage cancer. within the lack of additional data, it's sensible to aim for vitamin D levels ≥ 30 ng/mL altogether patients analyzed with breast cancer. Additional research is additionally required to define the number of vitamin D crucial to succeed in a shielding benefit against breast cancer , in my opinion is extremely important to form more research in future on this title .

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