

Link between Vitamin D and Cardiovascular Diseases

Kharb Manju*, Rathi Shikha and Jalwal Pawan

Department of Pharmaceutical Sciences and Research, Baba Mastnath University, Asthal Bohar, Rohtak, India

ABSTRACT

Over the last decades, cardiovascular diseases (CVD) effect is increasing very fast. This review article discuss the association between low level of 25-hydroxy vitamin and cardiovascular diseases. This review also tells us the direct effect of vitamin D on heart or on cardiovascular system may also be involved. Apart from regulating blood pressure, vitamin D also regulate endothelial and smooth muscle cell muscles, most studies support 25 (OH) vitamin D having protective effects on cardiovascular system. However this association of vitamin D and cardiovascular diseases is based on observation & ecological studies and thus is a matter of controversy. Adequate clinical data are not available to confirm these association. Unopposed activation of RAAS & generation of angiotensin promote arterial stiffing & endothelial dysfunction that proceed & contribute to the development of hypertension & also predictors of CVD risk.

Keywords: Cardiovascular diseases (CVD); Vitamin D; Calciferol; International unit (IU); 1- α -OH ase

INTRODUCTION about VITAMIN D

Vitamin is also called calciferol. It exist in two form vitamin D₂ and vitamin D₃ which are called ergocalciferol and cholecalciferol. Vitamin D₃ is also called "Sunshine vitamin" because this vitamin is synthesized in epidermis cell through UV radiation and it is also consumed from fish oil and supplements [1,2]. Deficiency of vitamin D is very common problem very often unrecognized and untreated, association with osteoporosis, muscles weakness, growth retardation in children, dental caries and also increase the risk of bone fracture in adults [2-6].

SOURCES of VITAMIN D

- Vitamin D is obtained from man dietary sources like fatty acid fish or through the conversion 7-dehydrocholesterol as a pre-hormone in the skin from exposure to sun rays. Vitamin D is also obtained from plant in the form of ergosterol [6-10].
- Chiook salmon 40Z cooked (amount of vitamin D (IU) 410)
- Shrimp 40 Z cooked (amount of vitamin D (IU) 160)
- Multiple vitamin most brand (amount of vitamin D (IU) 400)
- Canned salmon, 350 Z (amount of vitamin D (IU) 30)
- Dannon fusion smoothie 100z (amount of vitamin D (IU) 80)
- Tuna light canned in water 3 oz (amount of vitamin D (IU) 200)

- Milk 1 cup (amount of vitamin D (IU) 200)
- Cod 40 z cooked (amount of vitamin D (IU) 63)
- Fortified breakfast cereals, most brand (amount of vitamin D (IU) 40)
- Margarine, fortified 1 Tbsp (amount of vitamin D (IU) 40)

LEVEL of VITAMIN D in our BODY, EFFECTS of VITAMIN D and REQUIREMENT of VITAMIN D in our BODY

Requirement of vitamin D in our body is based on health recommended dietary allowance are 600 IU/d for individuals aged 1 to 70 years and 800 IU/d for older than 70 years under condition of minimum sun exposure. A survey is done by NHANES (National health& nutrition examination survey) which indicate that deficiency of vitamin D exists in more than half of US middle-aged & older women and more than a third of similarly aged men. In African-American individuals because of darkly pigmented skin there is less synthesis of vitamin D in response to sun exposure and also black have lower dietary & supplemental vitamin D intake than white [10-13].

*Corresponding author: Manju K, Department of Pharmaceutical Sciences and Research, Baba Mastnath University, Asthal Bohar, Rohtak, Haryana, 124001, India, Tel: +91 9416745816; E-mail: kharbmanju@gmail.com

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Mechanism by which vitamin D prevent CVD

The mechanism for how vitamin D prevent CVD is not clear but several mechanism has been proposed individuals. Such as:

Receptors of vitamin D are present throughout the vascular system including endothelial cells, vascular smooth muscles & cardiomyocytes which produce 1- α -hydroxylase enzyme. This enzyme converts 25-hydroxy vitamin D to calcitriol and this is the natural ligand of vitamin D receptor.

The calcitriol so formed inhibit proliferation of vascular smooth muscles and also regulate rennin-angiotensin system to lower BP may improving glycemic control, decrease coagulation and exhibit anti-inflammatory properties [13-16].

Physiology of vitamin D

After entering into the body vitamin D follow the following route:

Vitamin D into the body bound to vit.D binding protein, liver 25-hydroxyvitamin D (25-(OH) D)

Under influence of PTH, 1- α -hydroxylase (kidney)

Hormonal vitamin D, 1,25-dihydroxy vitamin D (1.25 (OH)₂D)

Only the kidney 1- α -OH-ase significantly contributes to circulating level of 1,25-(OH)₂ D level, the presence of external 1- α -OH-ase allow to convert 25 (OH) D 1,25 (OH)₂ D.

Than circulating vit D₁, 25 (OH)₂ enters into the cells where it needed, either in free form or in binding form.

LINKS between VITAMIN D and CVD

The main aim of this article is to explain the association of vitamin D deficiency & CVD.

Deficiency of vitamin D can cause endothelial dysfunction, proliferation of smooth muscle cells, formation of foam cells, atherosclerosis.

The other function of vitamin D is glycemic control, insulin secretion & sensitivity, lipid metabolism, prevention of secondary hyperparathyroidism.

REQUIREMENTS of VITAMIN D in our BODY

According to institute of medicine (IOM) the current vitamin D requirement is as follow

- 200 international unit (IU) per day for adults age 50 and younger.
- 400 (IU) per day for adults age 51 to 70 years.
- 600 (IU) per day for adults aged 70 ears.

The exact amount of vitamin D is not clear known, however man physician are now recommended 1000 IU to 2000 IU daily for mist adults.

The extra amount of vitamin D can increase calcium absorption, which can cause kidney stone or kidney damage.

USES of VITAMIN D

Vitamin D has also been associated with prevention and treatment of diabetes, cancer, osteoarthritis and immune system disorder.

A growing number of studies support that low level of vitamin D increased the chances of heart diseases and that addition of vitamin D supplements can decrease the risk.

CONCLUSION

Several trials are done to know the connection between vitamin D deficiency and CVD but there is not yet any clear conclusive evidence.

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