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EDITORIAL OPEN ACCESS

Vitamin D supplementation, polypharmacy and cardiovascular health in elderly

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Vitamin D is considered as a prohormone or hormone-like substance rather than a vitamin, because it is mainly synthesized in the epidermis upon exposure to sunlight. Metabolic activation of vitamin D needs different metabolic stages: Ultraviolet B lights convert 7-dehydrocholesterol to vitamin D3 in epidermis and then, following its 25-hydroxylation in the liver, it is 1-hydroxylated in the kidneys. Vitamin D is widely known for its role in calcium metabolism and bone health, but new roles are continually being discovered including its roles in mental health, systemic glucose regulation, immune system, and oncogenesis. We have chosen not to deal with the aforementioned roles in this editorial paper and concentrated on more recently proposed role of vitamin D on cardiovascular health in elderly people.

Vitamin D insufficiency has been shown to be a culprit for age-related cardiovascular disease which is the leading cause of death in elderly [1]. The Centers for Disease Control and Prevention attributes the growing elderly population primarily to the developments in the treatment of age-related cardiovascular disease and stroke, emphasizing that early diagnosis and prevention may improve mortality and morbidity rates, reducing health care costs. This highlights the importance of understanding the effects of vitamin D on cardiovascular health. The prevalence of vitamin D insufficiency in elderly individuals varies widely based on the highly disputed cut-off values. Despite lacking consensus on what the optimum systemic vitamin D levels should be, significant relationship has been found between below-average levels of vitamin D and cardiovascular morbidities such as high blood pressure, deranged renin-angiotensin-aldosterone system, left ventricular hypertrophy, heart failure, myocardial infarction, stroke [1–3]. Vitamin D plays an important role in reactive oxygen species formation and calcium-InsP3 signaling pathways, which are thought to be important factors in the pathogenesis of age-related cardiovascular disease [4]. Vitamin D also regulates renin secretion by intervening in renin-secreting cAMP signaling pathway in renin producing granular cells, down-regulating renin-angiotensin-system and decreasing systolic blood pressure [2, 3]. Thus, remembering the physiological and clinical importance of vitamin D and raising its status to optimum levels may improve impaired calcium-InsP3 signaling, excess angiotensin II and entothelin-1 production, oxidative stress, cardiac hypertrophy, congestive heart failure and peripheral vascular disease [4]. It has been proposed that with optimum vitamin D intake, reversing or slowing the progression of most of the aforementioned age-related cardiovascular disorders may be possible to some extent as exemplified by a study where vitamin D supplementation in hemodialysis patients improved cardiovascular death and in another study where vitamin D supplementation improved left ventricular ejection fraction and left ventricular remodeling [4–6].

Increasingly sedentary-indoor lifestyle and effects of polypharmacy should be kept in mind especially when caring for the elderly most of whom spend their life (a) indoors-immobile and (b) on poly-pharmacotherapy both of which impede a physician's efforts to reach vitamin D levels to the recommended levels [7, 8]. In the elderly, various aggravating factors affecting vitamin D status are especially abundant such as mobility problems-indoor life, atrophic skin alterations and renal dysfunction. These comorbidities contribute to deteriorated vitamin D status in elderly individuals, making the elderly more prone to vitamin D deficiency and associated age-related cardiovascular disorders. Another issue a physician should be aware of is the effects of polypharmacotherapy on systemic vitamin D status. Polypharmacy has recently

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been shown to be significantly associated with vitamin D deficiency in a cross-sectional Dutch study where geriatric outpatients were stratified on the number of concomitant medication use and then serum vitamin D levels were measured. In this study, authors concluded that multidrug usage should be considered as a risk factor for vitamin D insufficiency amongst geriatric patients [8]. Even though from this cross-sectional study cause-effect conclusion cannot be drawn, we should bear in mind that drugs; especially, sulfonamides and urea derivatives, selective serotonin reuptake inhibitors (SSRIs), angiotensin converting enzyme (ACE) inhibitors [8], may have unraveled side effects and they may be driving vitamin D deficiency into a vicious cycle where increased pharmacotherapy is aggravating the vitamin D deficit which in turn arising as a comorbidity, requiring pharmacotherapy and so on.

Due to multiple comorbidities, especially elderly individuals living in nursing homes happen to be one of the most vulnerable groups [7]. It has been shown that there is a strong relationship between vitamin D deficiency and cardiovascular disorders and recent evidence implies that polypharmacotherapy may be an aggravating factor. The relationship between polypharmacy induced vitamin D insufficiency and age-related cardiac disorders need further attention especially in the highly frail elderly. Lastly, it should be noted that poly-pharmacotherapy may be playing an important role in explaining why even with supplementation recommended vitamin D levels could not be reached in this frail elderly group.

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Keywords: Cardiovascular aging, Polypharmacy, Supplementation, Vitamin D

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Bahadir Şimşek – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Ufuk Çakatay – Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

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Conflict of Interest

Authors declare no conflict of interest.

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