EDITORIAL

VITAMIN D DEFICIENCY- CURRENT STATUS AND ITS IMPACT IN CLINICAL MEDICINE

From the desk of Editorial board

It has been estimated that one billion cases of Vitamin D Deficiency or Insufficiency is present worldwide. In several studies, 40 to 100% of U.S. and European elderly men and women are vitamin D deficient [1]. More than 50% of postmenopausal women taking rx for osteoporosis are vitamin D deficient wile 45/80 (56.2%) of geriatric patients in a UCDSOM study of vit. D education intervention study were vitamin D deficient.Vitamin D Levels in the LUCHAR Dataset showed 34/139 (24.5%) normal, 40/139 (28.8%) insufficiency, 65/139 (46.8%) deficiency [Mean 22.5 ng/mL with Range < 5 – 52 ng/mL]

In Northern China where 42% of infants were found to suffer from hypovitaminosis during the winter/ spring period, 89% of them are Chinese adolescent girls and 48% of old men had severe deficiency[2].Among postmenopausal women serum 25(OH)D level lower amongst the Malays (44±11nmol/ L) than the Chinese (69±16nmol/L) [2]

In SEA ,80% of the apparently healthy population is deficient in vitamin D (<20 ng/mL) and up to 40% of the population is severely deficient (<9 ng/mL) [3].Prevalence of hypovitaminosis D (25(OH)D <75nmol/L) in postmenopausal women in 47% in Thailand, 49% in Malaysia, 90% in Japan , 92% in South Korea. The mean serum 25(OH)D concentration was 48nmol/L in premenopausal women from Indonesia (6°S) and Malaysia (2°N)

In Pakistan, the median level of serum vitamin D was 18.8 (IQ range 12.65–24.62) ng/dL. A total of 253 (84.3%) respondents had low levels (30ng/dL) of 25OH vitamin D.In Karachi, 55% of infants and 45% of mothers had very low serum 25(OH)D levels (<25 nmol/L or 10 ng/mL) [4]

In North India (27°N), Hypovitaminosis D was found in 96% of neonates , 91% of healthy school girls , 78% of healthy hospital staff and 84% of pregnant women .() In South India (13°N) hypovitaminosis D was associated with inverse relationship between measured serum 25(OH)D levels and PTH levels and Vitamin D levels were significantly higher in rural compared to urban subjects. In Lucknow,India it was found that 84%t of pregnant women had 25(OH)D values below 22 ng/mL[5,6]

In Sri Lanka (7°N), mean 25(OH)D among healthy females was 35.3nmol/L , 40.5% of them had 25(OH)D values below 25nmol/L .High prevalence's was found in Skin hyperpigmentation, traditional clothing, air pollution , limited outdoor activity and urban population. [7]

In Bangladesh (24°N) hypovitaminosis D was found in women regardless of age, lifestyle and clothing and 25(OH)D levels below 37.5nmol/L was observed in 38% from high income group and 50% in women from low income groups. [8] Vitamin D deficiency (serum 25-OHD level <25 nmol/l) was detected in 39% of young women (university students), 30% in veiled women and 38% in diabetic women, respectively. [9,10]Though the rural students are less familiar with vitamin D ($p<0.001$) and osteoporosis ($p=0.0056$) than urban students, they exercise a healthy diet in terms of milk consumption ($p<0.0001$) and engage themselves more in outdoor activities. They spend more time in sunlight ($p<0.0001$) than the urban students and thus the rural students may require less supplemental support of calcium and/or vitamin D than the urban students ($p<0.0001$). [11] In another study between man versus woman, 50% of the men but only 23% of women spent e"2 hours outdoors per day during daytime hours ($n = 82$, $p=0.0007$). 24% of men and 0% of women reported outdoor professions ($p<0.0001$).Men's mean 25(OH)D (55.2 ±17.5 nmol/L) was significantly higher than women's (21.6 ±10.7nmol/L) (mean difference = 30.7 nmol/L; $p<0.0001$).A significantly lower proportion of men (6.0%) were vitamin D deficient (25(OH)D<30nmol/L) vs women (21.7%; $p<0.0001$) [12] . A study on socioeconomic groups [low(L) versus high (H)] Seventeen percent of women in group L and 12% of women in group H had serum 25-OHD concentration <25 nmol/l. Hypovitaminosis D (serum 25-OHD concentration 37.5 nmol/l) was observed in 50% of subjects in group L and 38% of subjects in group H, respectively.The prevalence of hypovitaminosis was

higher in lactating subjects of the groups L and H (63 and 46%, respectively) [13] .In a study in DMCH in preeclmpsia and eclampsia The prevalence of vitamin D insufficiency was very high with more than 3 quarters (78 %) of all subjects having a serum 25(OH)D level < 30 ng/ml. The mean serum 25(OH)D level was 24.86 ng/ml in controls, 23.96 ng/ml in pre eclamptic women, and 21.56 ng/ml in eclampsia patients. The odds of developing preeclampsia and eclampsia may increase by up to 5-fold in women with vitamin D insufficiency. [14] A thesis by Zannatul Mawa, showed students who are studying college do not have adequate knowledge of essential nutrients, minerals, vitamins etc. College students have a long academic background related to general biological science. If they have gap of knowledge about calcium and vitamin D, the general people may know little about these food supplements

Sources of Vitamin D are Exposure to sunlight ,dietary sources and dietary supplements. 5-10 minutes of direct exposure to the arms and legs , 3000 IU of vitamin D3.In a study in Boston, 36% had 25 OH vit D level < 20 ng/ml at the end of winter. The prevalence decreased to 4% by the end of summer. [1] Multiple studies show vitamin D def. common in sunny areas when most of the skin is shielded from the sun (Saudi Arabia, United Arab Emirates, Turkey, India and Lebanon)

1,25 OH Vitamin D Effects are increased calcium absorption in the gut,increased PTH mediated bone resorption ,decreased renal calcium and phosphorus excretion, decreased PTH secretion and increased bone calcification. PTH Effects are characterized by Increases tubular reabsorption of calcium, stimulates the kidney to produce 1,25 OH vitamin D, activates osteoblasts , which then stimulates the activation of osteoclasts , osteopenia and osteoporosis and increasing the risk of fracture. It also causes phosphaturia. A low Ca-Phos product leads to decreased mineralization of the collagen matrix leading to rickets in kids and osteomalacia in adults.

Non-classical Actions of Vitamin D are suppression of cell growth/proliferation, regulate apoptosis, modulate immune responses, susceptibility to infections, susceptibility to autoimmune disorders like Multiple Sskerosis, T1DM and effects in transplantation immunity. It also modulate keratinocyte differentiation and function and play key role in psoriasis therapy. Vit D suppress renin-angiotensin system, stimulate insulin secretion an control neuromuscular function and the brain. [15]

Mechanisms of Vitamin D Deficiency based on reduced skin synthesis by means of use of sunscreen (SPF 15 reduces D3 by 99%), skin pigmentation, aging (reduction of 7 dehydrocholesterol reduces vitamin D3 by 75%), season, latitude and time of day and also patients with skin grafts for burns. Inadequate dietary intake, malabsorptive disorders and obesity, impaired hydroxylation by the liver due to liver disease, increased hepatic catabolism due to medications, impaired renal production of 1,25 –OH vit. D in stage 4 and 5 CKD, renal loss of vit. D and vit. D binding proteins in nephrotic syndrome are also responsible factors for Vit D deficinecy

A meta-analysis of 7 RCT's evaluating fracture risk in pts given 400 IU of vit D3 per day revealed little benefit. [16] In studies using 700-800 IU of of vitamin D3 per day, the RR of hip fracture and nonvertebral fracture were reduced by 26% and 23% respectively compared to calcium and placebo. [16] Skeletal muscle has a vitamin D receptor for maximal function. A meta-analysis of 5 RCT with 1237 subject showed increased vitamin D reduced the risk of falls by 22%. It was found that 400 IU of vitamin D per day was not as effective 800 IU vitamin D per day for reduction of fracture and fall.

In a study of hypertensive patients who were exposed to ultraviolet B radiation three times per week for 3 months. 25 OH vitamin D levels increased by approximately 180% and both SBP and DBP were reduced by 6 mm Hg. In 10,366 children in Finland, 2000 IU of vitamin D3 per day (1st yr) & follow up the risk of Diabetes Mellitus was reduced by 80%. In subset analysis, among children with vitamin D deficiency, the risk was increased by 200% .Combined 1200 mg of calcium+ 800 IU of vitamin D lowered the risk by 33 % compared to <600 mg calcium+ < 400 IU of vitamin D.

Vitamin D levels of 40 ng/ml or higher may confer some protection against Multiple Sclerosis. Patients receiving Magnesium, Calcium and 5000 IU vitamin D significantly reduced MS exacerbations (14 vs 32). Vitamin D may be primarily associated with cognitive domains other than memory , such as executive cognitive functions, depression, bipolar disorders, and schizophrenia. Low 25(OH)D may be a risk factor for cognitive impairment (41-60%). Increased Vitamin D may improve cognitive function in patients with Alzheimer's disease. 25 OH vitamin D below 20 ng/ml are associated with 30-50% increased risk of incident and mortality of colon, prostate and breast cancer. D 1-alpha hydroxylase and 1,25 OH vitamin D act locally to control genes that prevent cancer by limiting cellular proliferation and differentiation by inhibiting angiogenesis and inducing apoptosis.

Among 13,331 adults 20 years or older from NHANES III testing association of low 25 OH vitamin D and all cause, cancer and cardiovascular mortality, it was found 1806 deaths, including 777 from CVD. In multivariate models (25 OH vitamin D <17.8 ng/ml) was associated with a 26% increased rate of all cause mortality, (95% CI, 1.08-1.46.) [17]

So it can be deduced that Vitamin D deficiency is common. 25 OH vitamin D is a predictor of bone health in terms of fracture risk and risk of falls and 25 OH vitamin D is also an independent predictor of risk of cardiovascular disease, hypertension, cancer, diabetes, all cause mortality, and URTI. Sensible sun exposure is a great way to maintain vitamin D sufficiency and we must encourage the risk and vulnerable group to enjoy the natural source of vitamin D. The sun vitamin is more important for countries like Bangladesh who are in a threat of vitamin D deficient era.

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