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EFFECT OF VITAMIN D DEFICIENCY ON CARDIOVASCULAR DISEASES AND LIPID PROFILE.

Laboratory Medicine

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ABSTRACT

Globally there is deficiency in vit D. Vit D is mainly from solar ultraviolet rays and to a lesser extent from natural and fortified foods.Vit D deficiency can lead to several bone diseases, osteomalacia, osteopenia, osteoporosis , rickets and non-skeletal diseases like cardiovascular conditions. All cardiac patients (100) included in the present study had low vit D, high risk for cardiac conditions and hyper lipidemia. Hence lipid profile and vit D is to be included as screening procedure in cardiac patients.

KEYWORDS

Vitamin D deficiency, cardiovascular diseases

INTRODUCTION

Vit D is metabolised by hepatic and renal hydroxyalse ti its active from 1,25(OH) vit D which exerts its function by binding to its receptor .Most of the nutritional requirement is met from cutaneous solar ultraviolet sunrays and to a lesser extent from foods naturally occurring or fortified . Its levels can be measured as 1,25[OH] Vit D .Vitamin D has been linked to several health outcomes including neuromuscular (rickets, bone fractures, osteopenia, osteoporosis and muscular weakness) and non-skeletal complications like cardiovascular diseases and risk factors such as congestive heart failure , impaired systolic and diastolic blood pressures, myocardial infarction, peripheral vascular disease, abdominal aortic aneurysm in older men and hypertension. It was also associated with tuberculosis, rheumatoid arthritis, multiple sclerosis, inflammatory bowel diseases, cancers, non-alcoholic fatty liver disease, cystic fibrosis, burn injuries, DM, insulin resistance and metabolic syndrome[1].

MATERIALS AND METHODS.

One hundred healthy controls and 100 cardiac patients' attended IP/OP of SK Hospital were included in the study. Blood was collected using disposable syringes and needles .Serum separated by centrifugation at 3500 rpm for 10 minutes using Kemi centrifuge.

Total cholesterol ,Triglycerides ,LDL-c and VLDL –c were measured using flex in Siemens Automated Chemistry Analyser supplied by Remedex.HDL-c measured using direct method .Vit D measured as 1,25(OH) vitD using Chemiluminescent Microparticle Immuno Assay (CMIA) using i1000SR instrument of Abbott USA.

RESULT

Total cholesterol, Triglycerides, HDL-c, LDL-c and VLDL –c expressed as mg/dl.Vit D expressed as µg/ml.Vit D levels were low in all cardiac patients compared to controls .Lipids are elevated in cardiac patients as reported.

Table - I Effect Of VIT D Deficiency On Dislipidemia And Cardiovascular Risk.

Lipid fractions	Controls	CVD
Cholesterol	87	182
TG	140	185
HDL-c	45	49
LDL-c	87	108
VLDL-c	20	25
Vit D	29	24

DISCUSSION

Vit D deficiency is a global problem. It is limited to several cardiovascular risk factors. Direct effects of vitamin D upon smooth muscle calcification and proliferation could contribute to their effects on cardiovascular health [2] .

In the analysis of NHANES III 1988– 1994, low vitamin D was associated with cardiovascular risk factors, including Diabetes Mellitus, obesity, and hypertriglyceridemia[3].

In a prospective nested case-control study between 1993 and 1999 of 18,225 US men (Health Professionals Follow-Up Study), low vitamin D was associated with a higher risk of myocardial infarction in comparison with sufficient 25(OH) D after multivariate adjustment [4].Kim and colleagues have found a high prevalence of hypovitaminosis D in individuals with cardiovascular diseases, mostly coronary heart disease .Another study showed a steady increase of plasma renin-angiotensin system in obese hypertensive individuals with low 25(OH)D. Furthermore in a study using 375 hypertensive and 146 normotensive individuals, showed that genetic variation at the Fok1 polymorphism ,a finding that support vit D vitamin D receptor complex as renin regulator in human[5].Therefore vit D analogs similar to ACE inhibitors and ARBs for patients with hyperreninemia, which can benefit patients with metabolic syndrome and hypertension. Other mechanisms that can lead to hypertension in vitamin D-deficient patients are arterial stiffness, endothelial dysfunction and hyperparathyroidism[6].

In the present study involving 100 controls and 100 cardiac patients showed low vit D and elevated lipid profiles. Hence it could be considered that vit D deficiency produces hyperlipidemia which could be the cause for cardiovascular diseases in cardiac patients.

Mutiple studies were done to evaluate the effects of vitD supplementation on cardiovascular diseases and mortality. In a randomised clinical trial of 5108 community-residents adults aged 50–84 year, monthly high-dose vitamin D supplementation (100,000 IU) did not prevent cardiovascular disease compared with placebo [7]. Furthermore, the EVITA (Effect of Vitamin D on All-cause Mortality in Heart Failure) randomized trial, did not show a reduction of mortality in patients with advanced heart failure received a daily vitamin D of 4000 IU compared with placebo [8]. Also, in a systematic review and meta-analysis of 18 trials and 13 observational studies, there were uncertain associations between vitamin D status and cardiometabolic outcomes[9]. In addition, another meta-analysis by Wang et al. showed a linear inverse association between 25(OH)D and risk of CVD[10]. While Ford et al.'s meta-analysis showed some benefits of vitamin D supplementation on cardiac failure, but not on MI[11].

With high prevalence globally vit D deficiency is not uncommon .It is associated with adverse health related problems. Current evidence suggest a higher risk of cardiovascular disease and risk factors with lower vit D status . Low vit D is associated with hypertension and

higher cardiovascular and all-cause mortality. The benefit of vitamin D supplementation to ameliorate the major adverse cardiovascular diseases and hypertension are conflicting with confounding biases. Therefore, higher randomized clinical trials are warranted to explore the benefits of vitamin D supplementation, which would at least reduce the impact of such high health problems.

CONCLUSIONS

Vitamin D deficiency is a global problem which increases the risk for cardiovascular disease, obesity, DM, and hypertension. All cardiac patient included in the study had low levels of vit D and hyperlipidemia. It is suggested that lipid profile should be included as a screening test for cardiac patients.

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