



A STUDY OF VIT-D AND TRACE ELEMENTS IN CORONARY HEART DISEASE PATIENTS

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Abstract: Coronary Heart Disease is a disease of attention as it is increasing in elderly as well as involving young population. Trace elements are important in many biochemical reactions and their concentration in blood may be related to CHD. Vit-D deficiency is also found related to CHD. A cross sectional analytic study was done. Total 80 cases and 80 controls were engaged in study after applying inclusion and exclusion criterion. Serum level of Vitamin D, copper and zinc was recorded. Most common group was 50-59 year age group. Serum level of Vit-D and zinc was significantly low in cases than controls. Level of S. copper was found low in control but was statistically non significant. In conclusion Vit-D Deficiency and deficiency of zinc have significant relationship with CHD.

Index Terms - Coronary Heart Disease, copper, zinc, Vitamin D

I. INTRODUCTION

Cardiovascular diseases is one of the major cause of morbidity and mortality in India and worldwide. It is responsible for more than one third of total deaths [1]. Coronary artery disease (CAD) leading the tally and regarded as most prevalent [2]. Indeed, CAD is acknowledged as an important threat to sustainable development in the 21st century [3]. The primary pathological process that leads to CAD is atherosclerosis, an inflammatory disease of the arteries associated with lipid deposition and metabolic alterations due to multiple risk factors. More than 70% of at risk individuals have multiple risk factors for CAD, and only 2 -7% of the general population have no risk factors [4].

Traditional risk factors such as lipid profile, blood pressure and smoking account for not more than 50% of CAD mortality [5]. Role of free radicals in developing degenerative diseases is well known. [6] Trace elements ,inflammatory markers and vitamins have role in formation atherosclerotic plaque. Zinc is an important component of copper zinc superoxide dismutase (Cu Zn SOD), which plays an emergent role in CHD. Zn deficiency can cause an increase in tissue oxidation damage. Imbalances between Cu and Zn may have role in atherosclerotic process. [7] VitD receptors are present in the cardiovascular system and epidemiological studies highlight the association of VitD status to CAD risk. [8]

MATERIAL AND METHODS

A cross sectional analytic study was done at Pacific Medical College and Hospital. Total 80 cases and 80 controls of age between 40 to 70 years were engaged in study after applying inclusion and exclusion criterion. Vit-D was estimated using Competitive electro-chemiluminescence protein binding assay on cobas e411. Serum Copper and Serum Zinc were analyzed in semi auto analyzer.

RESULTS

The mean age of cases was 55.76±8.33, and control was 58.56± 7.65. Most common age group was 50-59 followed by 60-69 and some cases were in 40-49 category. Average Vit-D in cases was 15.78 with SD 6.79 and in controls 26.78 with SD 5.17. The difference is statistically significant. Average Serum copper of cases is 89.32 with SD12.15 and control is 92.55 with SD 11.52 the difference is statistically not significant. Average Serum zinc level of cases is 64.58 with SD 14.66 and control is 96.83 with SD 15.88 .The difference is statistically significant.

Table 1-Comparision of Vitamin D level in cases and controls

Parameter in ng/ml	Case (n -100)	Control (n-100)	p-value
VIT D	15.78±6.79	26.78±5.17	<0.001

Table 2-Comparison of Serum copper and Zinc level in cases and controls

Parameter in ng/ml	Case (n -100)	Control (n-100)	p-value
S.copper	89.32 ±12.15	92.55±11.52	>0.05
S.zinc	64.58±14.66	96.83±15.88	<0.001

DISCUSSION

Present study is conducted in a tertiary care hospital of southern Rajasthan. Patients were of mostly 50-59 age group but disease was also present in 40-49 category which may be representative of early shift of epidemic of CAD. Early shift of epidemic was also mentioned by other studies done recently.⁹

In our study levels of vitamin D was found low in cases and it was statistically significant in comparison of control group. In a study done by Sun et al.¹⁰ they found high risk of developing CVA in low vitamin D levels in comparison with high levels. In another study The vitamin D level was found to be related to both severity at admission and favorable functional outcome in patients with ischemic CVA.¹¹ The effect of Vit-D supplementation on reducing CAD is studied and it was found controversial.¹² However, in a recent small scale randomized clinical trial, a single dose of 6 lac IU of Cholecalciferol Intramuscular (IM) injection was associated with a significant improvement in the stroke outcome after three months.¹³

In our study Serum copper levels were low in cases but not statistically significant. A study done by Aysegul Cebi et al¹⁴ in turkey revealed there is no significant difference in Serum levels of copper between CHD patients and normal individuals. Reunanen et al.¹⁵ and Lukaski et al.¹⁶ in contrast reported increased levels of serum Cu and a significant increase in urine Cu levels in patients suffering from myocardial infarction. Serum Zinc levels were significantly low on our study. Low serum Zn levels have been associated with increased cardiovascular mortality.¹⁵ Results of our study are consistent with the study done by Dr. Mashooq Ali Dasti et al.¹⁷ Some other studies^(18,19) also report zinc as deficient in CHD patients.

CONCLUSION

In this study we found vitamin D is significantly low in CHD patients. These Results further strengthen the hypothesis of relation of CHD with vitamin D Deficiency. Serum zinc found significantly low while Serum copper levels are low but not significant.

REFERENCES

- Heart disease and stroke statistics 2016 update. A report from the American Heart Association. Mozaffarian D, Benjamin E, Go A, et al. *Circulation*. 2016;133
- Global, regional, and national burden of cardiovascular diseases for 10 causes, 1990 to 2015. Roth GA, Johnson C, Abajobir A, et al. *J Am Coll Cardiol*. 2017;70:1–25.
- The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990 2016. Prabhakaran D, Jeemon P, Sharma M, et al. *Lancet Glob Health*. 2018;6:1339–1351.
- Frequent use of social networking sites is associated with poor psychological functioning among children and adolescents. SampasaKanyinga H, Lewis RF. *Cyberpsychology Behav Soc Netw*. 2015;18:380–385.
- Gey KF, Puska J, Jordan P. et al. Inverse correlation between plasma vitamin E and mortality from ischemic heart disease in cross cultural epidemiology. *Am J Clin Nutr*. 1991;53:326–334.
- Ames BN, Shigenaga MK, Hagen TM. Oxidants, antioxidants, and the degenerative diseases of aging. *Proc Natl Acad Sci*. 1993;90:7915–7922.
- The role of metals in neurodegenerative processes: aluminum, manganese, and zinc *Brain Res. Bull.*, 62 (2003), pp. 15 28 .
- Ai S, He Z, Ding R, et al. Reduced vitamin D receptor on circulating endothelial progenitor cells :a new risk factor of coronary artery diseases. *J Atheroscler Thromb* 2018;25:410–21.
- Ullewar MP, Ingale SV, Ingale VC, Upadhye JJ. Lipid profile in patients with coronary heart disease. *Int J Sci Rep* 2017;3(10):259-64.
- Sun Q, Pan A, Hu F, Manson J, Rexrode KM. 25-Hydroxyvitamin D levels and the risk of stroke: a prospective study and meta-analysis. *Stroke*. 2012;43:1470–7.
- Dobnig H, Pilz S, Scharnagl H, Renner W, Seelhorst U, Wellnitz B, Kinkeldei J, Boehm B, Weihrauch G, Maerz W. Independent association of low serum 25-hydroxyvitamin d and 1,25-dihydroxyvitamin d levels with all-cause and cardiovascular mortality. *Arch Intern Med*. 2008;168:1340–9.
- Mao P, Zhang C, Tang L, Xian Y, Li Y, Wang W, Zhu X, Qiu H, He J, Zhou Y. Effect of calcium or vitamin D supplementation on vascular outcomes: a meta-analysis of randomized controlled trials. *Int J Cardiol*. 2013;169:106–11.
- Shuba N, Prakash B. Role of vitamin D in the outcome of ischemic stroke- a randomized controlled trial. *J Clin Diagn Res*. 2017;11:CC06–10.
- Cebi A, Kaya Y, Gungor H, Demir H, Yoruk IH, Soylemez N, Gunes Y, Tuncer M. Trace Elements, Heavy Metals and Vitamin Levels in Patients with Coronary Artery Disease. *Int J Med Sci* 2011; 8(6):456-460. doi:10.7150/ijms.8.456. Reunanen A <https://www.medsci.org/v08p0456.htm>
- Reunanen A, Knekt P, Marniemi J. et al. Serum calcium, magnesium, copper and zinc and risk of cardiovascular death. *Eur J Clin Nutr*. 1996;50:431-437
- Lukaski HC, Klevay LM, Milne DB. Effects of dietary copper on human autonomic cardiovascular function. *Eur J Appl Physiol*. 1988;58:74-80
- Dasti MA, Hashmi SFA, Baloch GH, Shas SZA. Acute myocardial infarction serum zinc level in patients. *Professional Med J*. 2013;(4):556-61.

18. Nazir S, Ullah E, Hussain S, Bukhari SA Study of Serum zinc levels among patients of coronary artery disease conducted in a Tertiary Care Hospital. Biomedica 29. 2013
19. Little PJ, Bhattacharya R, Moreyra AE, Korichneva IL. Zinc and cardiovascular disease. Nutrition 2010; 26 (11-12): 1050-1057.

