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The Study Effect of Zinc and Calcium on Cardiovascular Diseases

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Abstract: This study conducted on too Iraqi patient with chronic atherosclerosis at age rang (29-70years) in Baquba teaching hospital in (center care unit) during the period from 25 September 2020to may 2021 . The patients divided in (55 mans and 45 patients) the total patient divided in tow groups according the treatment (30) of total patient under go to treatment for two to three days after atherosclerosis and 70 patient in same day of diagnosis of atherosclerosis . the study showed Decreasing in electrolytes Ca and Zn values.

1. Introduction

Cardiovascular Diseases

Cardiovascular diseases (CVDs) are multidimensional disorders that primarily impact the key aspects of the human circulatory system, like the heart, blood arteries, and blood itself. CVDs could be congenital or acquired during the course of a person's life. The biggest and most common cardiovascular developed issues are atherosclerosis, rheumatic heart disease, and cardiovascular inflammation [1].

Atherosclerosis

The German surgeon Felix J. Marchand (1846–1928) established the term "atherosclerosis" from the Greek words "athere" (gruel) and "scleros" (hard) [2]. Atherosclerosis is a chronic illness that affects the blood vessels. It is distinguished by a loss in elasticity as a consequence of the constriction and stiffness of the blood vessel walls produced by the accumulation of lipids, cholesterol, calcium, and other substances (minerals, cellular debris, and so on) in the inner layer of medium and large-sized arteries. Arteriosclerosis raises blood pressure, reduces blood flow to various bodily organs, and causes severe tissue damage. Furthermore, the plaque developed in the blood artery walls may rupture, resulting in the production of blood clots (thrombus), that could cause catastrophic obstructions in situ or elsewhere. The most significant health implications are ischemic heart disease or coronary heart disease (CHD) (inadequate supply of oxygen-rich blood to the heart muscle) and stroke (decrease in blood flow to brain tissue due to blood vessel obstruction or intracranial hemorrhage)[1].

Zinc(Zn) : Zinc is an important trace component and the second most common divalent cation in the body (2–4 g), with roughly 57% present in skeletal muscle and 29% in bone [3]. Zinc shortage may happen as a consequence of insufficient consumption, poor absorption, and/or increased loss. Zinc insufficiency is widespread over the globe, affecting about two billion individuals [4]. Many earlier investigations have found reduced blood zinc levels in patients with chronic kidney disease (CKD), with the incidence of zinc insufficiency ranging from 40% to 78 percent in those receiving hemodialysis [5,6].

Zinc is essential in several metabolic processes, such as a cofactor for over 300 enzymes. Furthermore, zinc is essential in structural integrity maintenance, fundamental cellular processes including proliferation, DNA and RNA synthesis, gene expression control, and immune function regulation in a variety of cell types [7,8]. According to earlier research, zinc deficiency was found to be correlated with growth disturbance, taste impairment [9], anorexia and loss of appetite [10], dermatitis , delayed wound healing [11], and infection . In addition, Zinc in essential in an active site of superoxide dismutase (SOD), an important antioxidant enzyme that catalyzes the dismutation of superoxide [12].

Calcium : In addition to its most well-known role as a vital structural component of bone, calcium performs a variety of vital positions in physiology and pathology. Several cells contain calcium-sensing receptors, and there is proof that calcium ion concentrations in extracellular fluid directly affect cell activity (e.g., parathyroid, renal tubule, and many more). The quantity of extracellular calcium has a direct influence on cell membrane potentials, and hence on the operation of all excitable tissues, including the nervous system and the heart. Calcium is an important transmitter in muscular contraction, especially the myocardium. It is an enzyme cofactor and is intricately engaged in blood coagulation; in particular, calcium chelators (citrate, ethylenediaminetetraacetic acid [EDTA]) are the most regularly employed anticoagulants in blood collection [13].

2. Experimental part

Zinc

Standard

Zinc STD. Cat.No.16221

Quality control

Meditrol N Cat. No. 15171

Meditrol P Cat. No. 15181

Procedure

Wave length	**Hg 546 nm**
Spectrophotometer	**560 nm**
Cuvette	**1 cm light path**
Temperature	**20-25 c**
Measurement	**Against reagent blank**
Reaction	**End point**

Assay

	Blank	**Standard**	**Sample**
Double dist Water	**50 µl**	--	--
Standard	--	**50 µl**	--
Sample	--	--	**50 µl**
Reagent	**1000 µl**	**1000 µl**	**1000 µl**

Mix , incubate for 8 min, at 20-25 c . Read the absorbance (A). The final colour is stable for at least 30 min.

Calcium

Procedure

Wave length	**570(550-590) nm**
Temperature	**37 c**
Optical path	**1cm**
Reaction	**End point(increasing)**

3. Result and discussion

The results of the statistical analysis showed the levels of zinc decreased in the patients (0.39 ± 0.02) when compared with control (0.55 ± 0.01) group p-value < 0.05 figure (1), (2) . the calcium level showed no different significant in the patients (9.72 ± 0.05) when compared with control (9.93 ± 0.08) group . zinc result was agree with Anna Chu,*et al*.(2016)[14] were observed that The association between serum zinc concentrations and risk of CVD events was reported in five studies . Four studies stratified serum zinc levels into tertiles or quartiles . In a multivariate model, each quartile decrease of serum zinc concentrations was associated with 10% increased risk of CVD mortality in patients referred for coronary angiography , calcium result was dis agree with Tiziana Montalcini, *et,al*.(2012),[15] were observed a positive relation between serum calcium levels, within normal range, and subclinical atherosclerosis in the carotid arteries, figure (2) table (1).

Table (1) serum Zinc, and serum Calcium in study groups(patients compared with controls)

Parameters	Group	Mean ± Std.	P-value
zinc	Control	0.55 ± 0.01	0.001
	Patients	0.39 ± 0.02	
Ca	Control	9.93 ± 0.08	0.064
	Patients	9.72 ± 0.05	

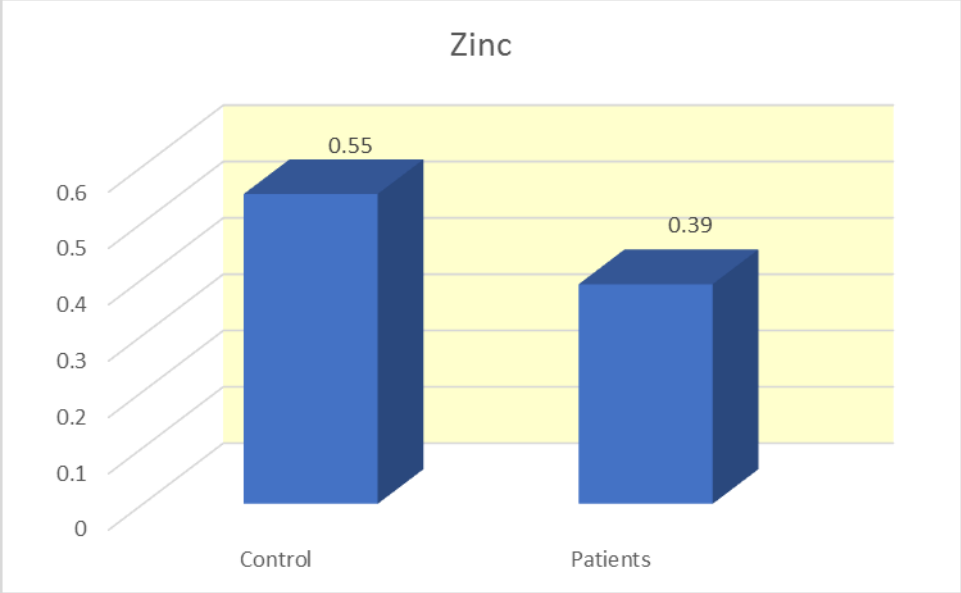

Figure (1) Zinc level in study groups

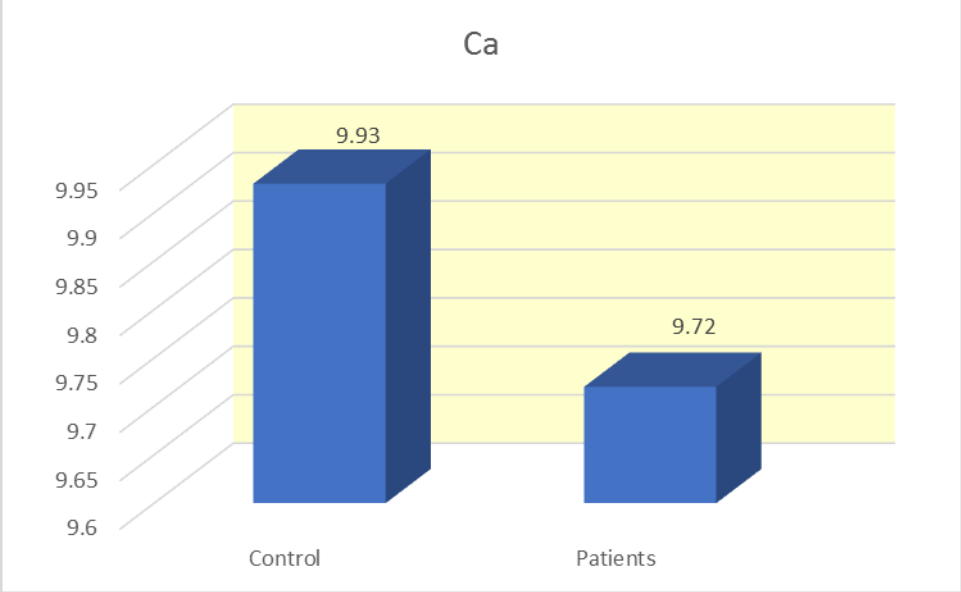

Figure (2) calcium level in study groups

References

1. Cardiovascular disease [Internet]. Eciclopaedia Britannica. [cited 2014 Dic 18.
2. Lorkowski S, Cullen P. Atherosclerosis: pathogenesis, clinical features and treatment. Encycl Life Sci. 2007; 2007:1–11.
3. Prasad, A.S. Zinc: Role in immunity, oxidative stress and chronic inflammation. Curr. Opin. Clin. Nutr. Metab. Care 2009, 12 .652–646 ,
4. MacDonald, R.S. The role of zinc in growth and cell proliferation. J. Nutr. 2000, 130, 1500S–1508S. [CrossRef[
5. Golden, M.H.; Golden, B.E. Effect of zinc supplementation on the dietary intake, rate of weight gain, and energy cost of tissue deposition in children recovering from severe malnutrition. Am. J. Clin. Nutr. 1981, 34, 900–908. [CrossRef] [PubMed[
6. Walravens, P.A.; Hambidge, K.M.; Koepfer, D.M. Zinc supplementation in infants with a nutritional pattern of failure to thrive: A double-blind, controlled study. Pediatrics 1989, 83, 532–538.
7. Henkin, R.I. Zinc in taste function: A critical review. Biol. Trace Elem. Res. 1984, 6, 263–280. [CrossRef[
8. Lask, B.; Fosson, A.; Rolfe, U.; Thomas, S. Zinc deficiency and childhood-onset anorexia nervosa. J. Clin. Psychiatry 1993, 54.66–63 ,
9. Gray, N.A.; Dhana, A.; Stein, D.J.; Khumalo, N.P. Zinc and atopic dermatitis: A systematic review and meta-analysis. J. Eur. Acad .Dermatol. Venereol. 2019, 33, 1042–1050. [CrossRef[
10. Prasad, A.S. Clinical manifestations of zinc deficiency. Annu. Rev. Nutr. 1985, 5, 341–363. [CrossRef[222 .Yang, C.Y.; Wu, M.L.; Chou, Y.Y.; Li, S.Y.; Deng, J.F.; Yang,W.C.; Ng, Y.Y. Essential trace element status and clinical outcomes in long-term dialysis patients: A two-year prospective observational cohort study. Clin. Nutr. 2012, 31, 630–636.
11. Prasad, A.S.; Bao, B. Molecular Mechanisms of Zinc as a Pro-Antioxidant Mediator: Clinical Therapeutic Implications. Antioxidants (Basel) 2019, 8, 164.
12. Reid IR, Gamble GD, Bolland MJ. Circulating calcium concentrations, vascular disease and mortality: a systematic review. J Intern Med 2016;279:524-40.
13. Hennekens CH, Gaziano JM. Antioxidants and heart disease: Epidemiology and clinical evidence. Clin Cardiol 1993;16 4 Suppl 1:I10-3.
14. Anna Chu, Meika Foster, and Samir Samman " Zinc Status and Risk of Cardiovascular Diseases and Type 2 Diabetes Mellitus—A Systematic Review of Prospective Cohort Studies " v .8(11) 2016.
15. Tiziana Montalcini, Gaetano Gorgone, and Arturo Pujia " Serum calcium level is related to both intima-media thickness and carotid atherosclerosis: a neglect risk factor in obese/overweight subjects "Journal of translational Medicine,v10(2012).