

Alkaline Phosphatase as a Marker For The Calcification of Coronary Arteries



Biochemistry

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ABSTRACT

Alkaline phosphatase primarily used as a marker for bone calcification. The serum alkaline phosphatase level has shown to be prognostic factor in myocardial infarction and peripheral vascular disease by its promoting effect on vascular calcification. Considering this vascular calcification contributes to atherosclerosis, vascular hardening and ageing. Serum alkaline phosphatase level may also be linked with poor vascular fate in overall patients with CAD (Coronary artery disease) as well as MI (myocardial infarction) survivors. It was a cross-sectional study. The patients who have disease of coronary vessels admitted for bypass surgery were taken as study cases (n=50) and healthy persons were taken as control (n=50). Both groups are age and sex matched. Serum alkaline phosphatase estimation was done by kinetic method by PNP (p-nitro phenyl phosphate) readymade kit in architect c-8000 (fully automated closed system instrument). Data were presented as mean± SD. P-value (<0.05) was taken as significant.

Introduction:

Coronary artery disease is one of the leading cause of death in the world and major cause of hospital admissions. The disease is caused by plaque building up along the inner wall of arteries of heart, which narrows arteries and reduces blood flow to the heart.¹ Arterial inflammation has recent patho-physiological relation in the development and progression of atherosclerosis which plays a major role in adverse cardiovascular outcomes. Serum Alkaline phosphatase (ALP) is a membrane bound metallo-enzyme that catalyses the hydrolysis of organic pyrophosphate, an inhibitor of vascular calcification.² ALP is routinely used in the diagnosis of disorder related to liver and bone, but it also to lesser extent found in kidney, placenta and intestines.³ Its correlation with inflammation, obesity, atherosclerosis makes alkaline phosphatase a predictor of cardiovascular disease.⁴ At present limited number of studies were done in this area so I interested to correlate and evaluate the pathological relationship between ALP and coronary artery disease.

Material and Method:

In the present cross-sectional study 50 clinically suggested patients of coronary artery disease and 50 normal subjects were selected from various wards/units of Sheth Vadilal Sarabhai General Hospital, Ahmedabad. All patients are primarily evaluated by clinicians for clinical examination and other relevant investigation for the diagnosis of coronary artery disease.

Study group:

Group 1: Clinically suggested patients of coronary artery disease. (n=50)

Group 2: Normal subjects as control (n=50)

Inclusion criteria for group 1:

➤ Patients having clinical sign & symptoms of coronary artery disease like chest pain, breathlessness etc.

➤ Agree to comply with my study

Inclusion criteria group 2:

➤ Clinically and apparently healthy persons having no sign and symptoms of coronary artery disease.

➤ Age and sex matched persons

Agree to comply with my study.

Exclusion criteria:

- Patients with chronic kidney, liver and bone disease.
- Patients with chronic inflammatory disease like arthritis, rheumatoid arthritis etc.
- Not agree to comply with my study.

Sample analysis: All samples were subjected to analyze for the estimation of ALP by kinetic method⁸ Estimation of ALP is carried out by using Spectrophotometric technique in fully automated closed system c-8000. Results were assured by standard internal & external quality control programme.

Statistical analysis: statistical analysis in terms of average age for male & female, positive predictive value, negative predictive value were done with appropriate statistical calculation.

Results:

In study group 1 out of total 50 patients, 31 were males and 19 females and average age was 50.66 year. While, in control group 2 out of total 50 normal subjects, 34 were males and 16 were females and average age was 49.98 year.

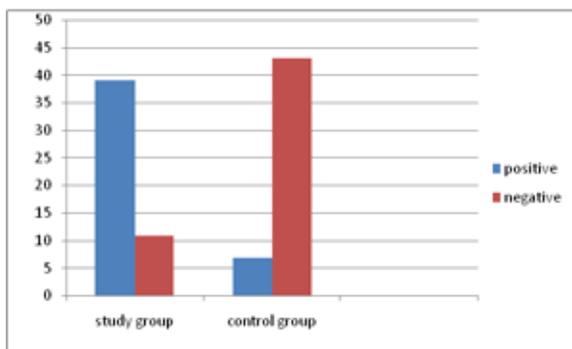
Table 1: Showing total no. of male and female & average age in group-1 & group-2

	Group-1(study group)	Group-2(control group)
Male	31	34
Female	19	16
Average Age(years)	50.66	49.98

Table 2: Comparison of S.ALp level in Control group and Cases group.(considering normal range 30-150 IU/L)

Group	Mean ±SD
Group-1	230±35.5 IU/L
Group-2	130±30.5 IU/L

Chart: Comparison of Higher & Lower ranges (on the basis of normal range) of ALP in both groups.



Discussion:

Vascular calcification is the major contributors to atherosclero-

sis causing vascular hardening and ageing eventually significant vascular events.¹ Elevated ALP level may promote vascular calcification via the pyrophosphate pathway. The catalytic activity of alkaline phosphatase can do inactivation of pyrophosphate, a potent inhibitor of hydroxyapatite crystal growth and potential local and circulating inhibitor of vascular calcification.²⁻⁴ In vascular disease, Atherosclerosis is associated with inflammatory processes and advanced atherosclerotic plaque there is calcification and increased expression of alkaline phosphatase⁷

Conclusions:

It has been hypothesized that the association between ALP and CVD may be acting through inflammation.^{5,6} In Cardio-vascular disease, atherosclerosis serum ALP is widely available vasculopathic prognostic parameter for coronary artery disease. My results are significant with correlation of ALP and coronary artery disease. This study may helpful to prevent risk of vascular calcification and improve poor survival of the patients with CAD.

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