

ORIGINAL ARTICLE

EVALUATION OF SERUM ALBUMIN LEVELS IN ACUTE MYOCARDIAL INFARCTION

Shilpa H. D¹

HOW TO CITE THIS ARTICLE:

Shilpa H. D. "Evaluation of Serum Albumin Levels in Acute Myocardial Infarction". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 42, October 19, 2015; Page: 7416-7421, DOI: 10.18410/jebmh/2015/1003

ABSTRACT: BACKGROUND: Acute myocardial infarction (AMI) is one of the major causes of mortality and morbidity in the world. Serum albumin levels are inversely related with age, smoking, blood pressure and obesity. It is not clear whether low serum albumin level is a nonspecific, prognostic variable, a marker of subclinical disease, or whether it is a part of causal mechanism leading to death due to cardiovascular disease. Some studies have reported an inverse association between serum albumin and cardiovascular mortality but others have not.¹ The association between serum albumin and cardiovascular mortality remains controversial. This study was done to evaluate the serum albumin levels in patients with ST segment elevation Myocardial infarction (STEMI) over a period of three days from the date of admission and whether the changes had any relationship with the prognosis of the patient. **AIM:** to associate changes in serum albumin levels in AMI patients over a period of three days i.e., day zero-at the time of admission, day+1-the following day(12 to 30hrs after collecting first sample), day +2(32 to 54 hrs after collecting first sample) with the clinical prognosis of the patient. **SETTINGS AND DESIGN:** Prospective follow up study in patents admitted with AMI in a tertiary care hospital. **METHODS:** 30 patients admitted with STEMI were included in the study and serum albumin levels were estimated in them on admission and for two days thereafter. Statistical analysis used. The data was analysed using SPSS 15.0, STATA 8.0, MEDLAC9.0.1, And SYSTAT 11 softwares. Repeated measures analysis of variance and student t test was used to find the significance in changes of serum albumin levels and prognosis of the patient on different days. **RESULTS AND CONCLUSION:** This study found that there was fall in serum albumin levels in patients with AMI in the course of three days compared with the day of admission and it was significantly associated with bad prognosis.

KEYWORDS: Acute myocardial infarction, Serum albumin levels.

INTRODUCTION: Coronary heart disease (CHD) is the leading cause of death in industrialized nations. The role of serum albumin as a free radical scavenger is well established. Albumin is the main source of thiol groups in the serum and protein thiol oxidation is a sensitive marker for oxidative stress after diseases like AMI.² Synthesized in the liver, serum albumin concentration falls (20%) during an inflammatory process. Albumin is inversely correlated with age, smoking, obesity, and blood pressure. It is not clear whether low serum albumin level is a nonspecific, prognostic variable, a marker for subclinical disease, or whether it is part of the causal mechanism leading to CHD1.³ Hypoalbuminemia on admission is a strong independent predictor for long-term mortality and development of advanced HF in patients with STEMI undergoing p-PCI.⁴ There are studies showing low basal serum albumin levels are significantly associated with

ORIGINAL ARTICLE

no reflow after primary percutaneous coronary intervention. 4 Previous studies have suggested that a lower concentration of serum albumin is associated with a 2-fold increased risk of total cardiovascular mortality, all-cause mortality, and cancer mortality.¹ Contrary to these studies, Law et al did not find evidence for an association between lower levels of serum albumin and mortality from cardiovascular disease or cancer.³ The association between low serum albumin levels and mortality after AMI remains controversial. Hence this study was undertaken to evaluate whether there is any significant change in the serum albumin levels in AMI after admission compared to the baseline values on admission and whether such change is associated with the prognosis of the patient.

METHODS: 30 patients admitted with STEMI were included in the study and serum albumin levels were estimated in them on admission and for two days thereafter. Serum albumin levels in AMI patients over a period of three days i.e., day zero-at the time of admission, day+1-the following day (12 to 30hrs after collecting first sample), day +2(32 to 54 hrs after collecting first sample) was measured. Prognosis was assessed based on TIMI score.⁵ A score of 7 or less was considered good prognosis and more than 7 bad prognosis. Albumin levels were estimated using bromocresol green method.⁶

Change in albumin levels over the course of three days taking the values on admission day as baseline value was assessed and whether this change had any association with the prognosis of the patient was assessed.

Inclusion Criteria:

- A. All patients with ST segment elevation myocardial infarction.
- B. Age group -30 to 60yrs.

Exclusion Criteria:

- A. Patients who have developed renal/ cerebral complications during the course of the study.
- B. Cases of non ST segment elevation myocardial infarction.

STATISTICS⁷: the data was analysed using SPSS 15.0, STATA 8.0, MEDLAC9.0.1, AND SYSTAT 11 softwares. Repeated measures analysis of variance and student t test was used to find the significance in changes of serum albumin levels and prognosis of the patient on different days. Significance is assessed at 5% level of significance. Chi square test and Fisher's exact test has been used to find the significance of study parameter and prognosis on categorical scale.

Significant Figures:

- Suggestive significance-p value; $0.05 < p < 0.10$.
- Significant-p value: $0.01 < p < 0.05$.
- Strongly significant-p value: $p < 0.01$.

Ethics: Written informed consent was obtained by all participants and the study was approved by the ethics committee of the hospital where it was carried out.

ORIGINAL ARTICLE

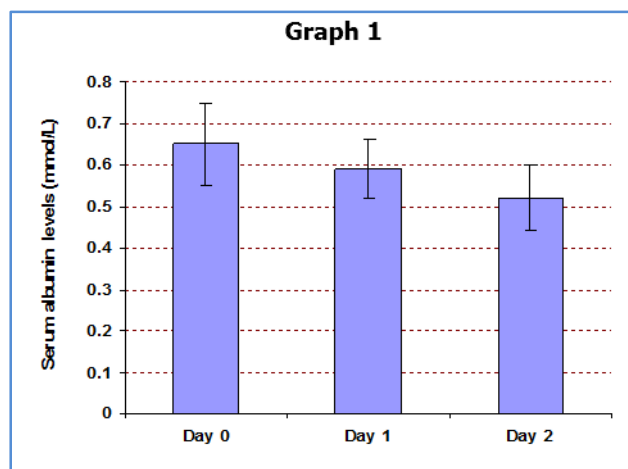
RESULTS: Table 1 shows age distribution of patients. Table 2 shows gender distribution of patients. Table 3 shows prognostication of patients. Table 3(graph 1) shows the mean value of albumin levels during the study period on the day of admission it was noted that the mean albumin value was 0.65 ± 0.10 (0.4-0.81) mmol/L, on day 1 it was 0.59 ± 0.07 (0.39-0.72) mmol/L, and on day 2 it was 0.52 ± 0.08 (0.34-0.7) mmol/L. Thus there was a significant decrease in the serum albumin values on day 1 and day 2 compared to the baseline value on the day of admission (day zero) with a p value < 0.001 . Table 4(graph 2) shows the change in serum albumin values in relation to prognosis indicating that decrease in serum albumin values is significantly associated with bad prognosis of patient. Thus this study shows that a decrease in serum albumin levels is associated with bad prognosis in AMI patients.

Age in years	Number	%
45-50	3	10.0
51-60	18	60.0
61-70	9	30.0
Total	30	100.0
Mean \pm SD	58.00 \pm 5.69	
Table 1: Age distribution of patients studied		

Gender	Number	%
Male	23	76.7
Female	7	23.3
Total	30	100.0
Table 2: Gender distribution of patients studied		

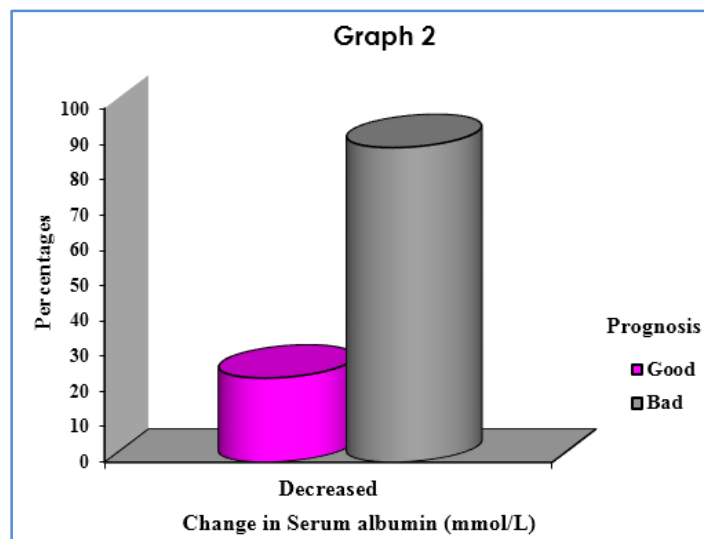
Variables	Day 0	Day 1	Day 2	Significance
Serum albumin levels (mmol/L)	0.65 ± 0.10 (0.40-0.81)	0.59 ± 0.07 (0.39-0.72)	0.52 ± 0.08 (0.34-0.70)	F=49.082; P<0.001**
Results are presented in Mean \pm SD (Min-Max)				
Table 3: Evaluation of study parameter during myocardial infarction				

ORIGINAL ARTICLE



Serum albumin levels (mmol/L)	Prognosis		Significance
	Good	Bad	
Day 0	0.68±0.07	0.59±0.13	t=2.589;p=0.015*
Day 1	0.61±0.05	0.56±0.09	t=2.457;p=0.020*
Day 2	0.53±0.08	0.49±0.08	t=1.388;p=0.264
% change at day 1	-10.3%	-5.1%	-
% change at day 2	-22.1%	-16.9%	-
Significance	F=43.025; P<0.001**	F=8.581; P=0.011**	-

Table 4: Evaluation of patients based on Serum albumin levels (mmol/L) in relation to prognosis



ORIGINAL ARTICLE

DISCUSSION: There is increase in medical research evidence that elevated serum albumin protects against consequences on ischemic heart disease⁸. It has been suggested that the relation between serum albumin and cardiovascular disease may vary across gender, age, and level of cholesterol. There is substantial evidence to indicate that decreased albumin may be casually related to AMI death.⁹ Albumin has antioxidant properties. Albumin inhibits the production of free hydroxyl radical and hydrogen peroxide and it is able to scavenge other free radicals. Albumin also inhibits copper dependent lipid peroxidation systems. LDL oxidation is one of the early events in atherosclerotic process. Low serum albumin levels is a well-known clinical feature accompanying various disease.¹⁰ Studies have observed that the variation in serum albumin levels was within a narrow physiological range in AMI patients supports evidence in favor of cause effect relationship between decreased albumin levels and cardiovascular disease mortality.¹¹ Lower albumin levels may be a marker of persistent injury to arteries and progression of atherosclerosis and thrombosis.⁸ Although some studies did not find evidence for association between low serum albumin levels and bad prognosis from cardiovascular diseases like AMI, other studies are in favor of detrimental effects of low albumin levels in the course of the disease, being associated with bad prognosis.^{1,3} This study is in favor of such studies indicating that decrease in serum albumin levels from baseline value may serve as a bad prognostic marker for acute myocardial infarction patients.

REFERENCES:

1. Danesh J, Collins MR, Appleby P. Association of fibrinogen, CRP, albumin, leukocyte count with heart disease-metaanalyses of prospective studies. JAMA 1998; 279: 1477-1482.
2. Miller NJ, Johnston JD, Collins CS, Rice Evans CA. Serum total antioxidant activity after myocardial infarction. Ann Clin Biochem 1997; 34: 85-90.
3. Law MR, Monis JK, Wald NJ. Serum albumin and mortality in the BUPA study –British United Provident Association. Int J Epidemiol 1994; 23: 38-41.
4. Kurt M, Akgun T, Bulet M, Pala S, Kirma C. The prognostic value of serum albumin levels on admission in patients with acute STEMI undergoing a primary percutaneous coronary intervention. Coron Artery Dis 2013; 24(2): 88-94.
5. Morrow DA, Elliot M, Antmann MD, Charlesworth A, Cairns R, Sabina A et al. Thrombolysis in myocardial infarction 2000; 102: 2031-2037.
6. Janet R McMurray-Plasma proteins in Gowenlock AH, McMurray JK, Mclauchlan DM, eds. Varleys practical clinical biochemistry 6th ed. Heinmann medical books; 1988: 408-411.
7. Bernard Rosner Fundamentals of Biostatistics, 5th ed, Duxbury: 80-240.
8. Kuller LH, Eichner JE, Orchard TJ, Grandits GA, Mc Callum L, Tracy RP. The relation between serum albumin levels and risk of CHD in the multiple risk factor intervention trial. Am J Epidemiol 1991; 134: 1266-1277.
9. Halliwell B. Albumin: An important extracellular antioxidant? Biochem Pharmacol 1988; 37: 569-71.
10. Luome PV, Naysha S, Sikkila KE. High serum alpha tocopherol, albumin, selenium, cholesterol and low mortality from CHD in northern Finland 1995; 237: 49-54.

ORIGINAL ARTICLE

11. Arne T Horsmark. Serum albumin and prevalence of coronary heart disease-A population based cross sectional study. *Norsk Epidemiologi* 2003; 13(1): 107-113.

AUTHORS:

1. Shilpa H. D.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Biochemistry, SUT Academy of Medical Sciences, Vencode, Vattapara, Thiruvananthapuram.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shilpa H. D,
Associate Professor,
Department of Biochemistry,
SUT Academy of Medical Sciences,
Vencode, Vattapara,
Thiruvananthapuram.
E-mail: shilpadhruva@gmail.com

Date of Submission: 05/10/2015.
Date of Peer Review: 06/10/2015.
Date of Acceptance: 08/10/2015.
Date of Publishing: 15/10/2015.