

## STUDY OF DERITIS RATIO IN ACUTE MYOCARDIAL INFARCTION PATIENTS IN A TERTIARY CARE HOSPITAL

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**ABSTRACT****Introduction:** The ratio of Aspartate Aminotransferase (AST) to the Alanine Aminotransferase (ALT) is known as the Deritis ratio. Many studies have highlighted, the significance of AST and ALT measurement as a prognostic significance in cardiovascular diseases including acute myocardial infarction. The current study aimed to discuss the correlation of Creatine Kinase MB (CKMB) and Cardiac Troponin I with the Deritis ratio in the retrospectively enrolled Nepalese population.**Materials and Methods:** Two hundred and sixty-four (264) cases of acute myocardial infarction who had undergone AST and ALT measurement were enrolled for the study by non-probability purposive sampling technique. The study variables are AST, ALT, CKMB, Troponin I, age, etc. The above-mentioned variables were measured by using a fully automatic clinical chemistry analyzer Beckmann Coulter AU480 after proper quality control check and calibration.**Result:** Out of 264 patients, 162 were male and 102 were female. There was no significant difference in age ( $P$  value: 0.54) and Deritis ratio ( $P$  value: 0.73) between the male and female genders when the mean and standard deviation were compared. The non-parametric correlation (Spearman's rho) analysis revealed the positive correlation of Deritis ratio with the cardiac troponin I (0.18, 0.00) which is statistically significant. Secondly, the Deritis ratio was positively correlated with the CKMB (0.40, 0.00) which was statistically significant.**Conclusion:** Our results have shown the raised Deritis ratio in acute myocardial infarction patients, which represents the release of AST during the myocardial infarction or the stress to the hepatocytes due to the hemodynamic changes occurring during myocardial infarction.**Keywords:** Acute Myocardial Infarction, ALT, AST, Deritis Ratio**INTRODUCTION**

The ratio of Aspartate aminotransferase (AST) to Alanine Aminotransferase (ALT) is known as the Deritis ratio, which was proposed by Fernando Deritis in 1957.<sup>1</sup> ALT and AST have been the biomarkers of the liver function test, which can be easily measured and assessed in the clinical chemistry laboratory.<sup>2,3</sup>

Some studies have highlighted the significance of the AST and ALT measurement as a prognostic predictor of patients with acute and chronic cardiac failure.<sup>2,4,5</sup> The ALT is elevated in the serum mainly due to liver diseases however, the AST can be released in the blood circulation in conditions like acute myocardial infarction, skeletal

muscle injury, kidney injury, etc. The hepatic injury may be the outcome of the cardiovascular disease.<sup>6</sup>

Acute and chronic ischemic hepatic injury may occur due to cardiac failure. Moreover, hemodynamic changes may occur as a result of heart failure which may lead to the elevation of the hepatic markers along with the cardiac markers in many cases.<sup>7</sup>

Afterward, the underlying cause of hepatocellular necrosis and rising AST and ALT during acute or chronic heart failure may be considered passive congestion from increased filling pressure or impaired perfusion due to low cardiac output.<sup>8</sup> The increase in venous pressure leads to the atrophy of the hepatocytes and causes perisinusoidal edema, so the hepatocytes are deprived of oxygen and nutrients to the hepatocytes.<sup>9,10</sup> In addition, the increment of the liver function parameters is observed with decreasing cardiac output and increasing cardiovascular pressure.<sup>11</sup>

This study aimed to find out the correlation between the Deritis ratio and the markers of acute myocardial infarction (that are CKMB and troponin I) in acute myocardial infarction patients in a tertiary care hospital of the National Medical College and Teaching Hospital. Moreover, the study also aimed to compare the Deritis ratio, CKMB, and troponin I were compared between male and female patients. The prevalence of the Deritis ratio elevation was also found.

## MATERIALS AND METHODS

The current study was a hospital-based retrospective study conducted at the National Medical College and Teaching Hospital, Birgunj, Parsa, Nepal. Two hundred and sixty-four (264) cases of acute myocardial infarction who had undergone AST and ALT measurement were enrolled for the study by non-probability purposive sampling technique. The study variables are AST, ALT, CKMB, Troponin I, age, etc. The above-mentioned variables were measured by using a fully automatic clinical chemistry analyzer Beckmann coulter AU480 after proper quality control check and calibration.

The study duration was six months (March 2023 to August 2023). The ethical clearance certificate was obtained

from the institutional review committee (Reference no:F-NMC/631/079-080) of the National Medical College and Teaching Hospital, Birgunj, Nepal. The informed consent was taken from the patients or the visitors before enrolling into our study.

All the data were entered into the Microsoft Excel version 2016 and converted into the SPSS version 25 accordingly. The data were organized based on the normality distribution. For the normally distributed data student t-test was used to compare the mean and standard deviation and for non-normally distributed data the Whitney U test was used. Spearman's correlation analysis was done to find out the correlation between the Deritis ratio and markers of acute myocardial infarctions which are creatine kinase MB and troponin I. The P value less than 0.05 was considered statistically significant.

## RESULTS

The current study revealed the status of the Deritis ratio in acute myocardial infarction patients who visited the National Medical College and Teaching Hospital. Out of 264 patients, 162(61.37%) were male and 102(38.63%) were female. There was no significant difference in age (P value: 0.54) and Deritis ratio (P value: 0.73) between the male and female genders when the mean and standard deviation were compared. We did not reveal any significant difference when CKMB (P value: 0.29), troponin I (0.95), AST (P value: 0.52), and ALT (0.28) between the male and female gender when the median was compared as depicted in table 1.

Table 1: Gender-wise distribution and the comparison of the data (n=264)

S. N.	Variables	Male (n=162)	Female (n=102)	P value*
1	Age	59.38 ± 14.68	60.42 ± 11.28	0.54
2	Deritis ratio (AST/ALT)	2.08 ± 0.94	2.04 ± 0.86	0.73
3	Troponin I	2.24 (0.95-3.54)	2.22 (0.79-3.90)	0.95
4	CKMB	14.24 (8.45-22.66)	12.47 (7.96-19.24)	0.29
5	AST	197 (115-250)	200 (143-281)	0.52
6	ALT	100 (58.75-116.75)	100 (59-168)	0.28

Firstly, non-parametric correlation (Spearman's rho) analysis revealed the positive correlation of Deritis



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**REFERENCES:**

1. DE RITIS F, COLTORTI M, GIUSTI G. An enzymic test for the diagnosis of viral hepatitis; the transaminase serum activities. *ClinChimActa*. 1957 Feb;2(1):70-4. doi: [10.1016/0009-8981\(57\)90027-x](https://doi.org/10.1016/0009-8981(57)90027-x). PMID: [13447217](https://pubmed.ncbi.nlm.nih.gov/13447217/)..
2. Gao M, Cheng Y, Zheng Y, Zhang W, Wang L, Qin L. Association of serum transaminases with short- and long-term outcomes in patients with ST-elevation myocardial infarction undergoing primary percutaneous coronary intervention. *BMC CardiovascDisord*. 2017 Jan 28;17(1):43. doi: [10.1186/s12872-017-0485-6](https://doi.org/10.1186/s12872-017-0485-6). PMID: [28129742](https://pubmed.ncbi.nlm.nih.gov/28129742/); PMID: [PMC5273829](https://pubmed.ncbi.nlm.nih.gov/PMC5273829/).
3. Steininger M, Winter MP, Reiberger T, Koller L, El-Hamid F, Forster S, Schnaubelt S, Hengstenberg C, Distelmaier K, Goliasch G, Wojta J, Toma A, Niessner A, Sulzgruber P. De-Ritis Ratio Improves Long-Term Risk Prediction after Acute Myocardial Infarction. *J Clin Med*. 2018 Nov 23;7(12):474. doi: [10.3390/jcm7120474](https://doi.org/10.3390/jcm7120474). PMID: [30477196](https://pubmed.ncbi.nlm.nih.gov/30477196/); PMID: [PMC6306912](https://pubmed.ncbi.nlm.nih.gov/PMC6306912/).
4. Allen LA, Felker GM, Pocock S, McMurray JJ, Pfeffer MA, Swedberg K, Wang D, Yusuf S, Michelson EL, Granger CB; CHARM Investigators. Liver function abnormalities and outcome in patients with chronic heart failure: data from the Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity (CHARM) program. *Eur J Heart Fail*. 2009 Feb;11(2):170-7. doi: [10.1093/eurjhf/hfn031](https://doi.org/10.1093/eurjhf/hfn031). PMID: [19168515](https://pubmed.ncbi.nlm.nih.gov/19168515/); PMID: [PMC2639422](https://pubmed.ncbi.nlm.nih.gov/PMC2639422/).
5. Sulzgruber P, Koller L, Reiberger T, El-Hamid F, Forster S, Rothgerber D-J, et al. (2015) Butyrylcholinesterase Predicts Cardiac Mortality in Young Patients with Acute Coronary Syndrome. *PLoS ONE* 10(5): e0123948. <https://doi.org/10.1371/journal.pone.0123948>
6. Alvarez AM, Mukherjee D. Liver abnormalities in cardiac diseases and heart failure. *Int J Angiol*. 2011 Sep;20(3):135-42. doi: [10.1055/s-0031-1284434](https://doi.org/10.1055/s-0031-1284434). PMID: [22942628](https://pubmed.ncbi.nlm.nih.gov/22942628/); PMID: [PMC3331650](https://pubmed.ncbi.nlm.nih.gov/PMC3331650/).
7. Fouad YM, Yehia R. Hepato-cardiac disorders. *World J Hepatol* 2014; 6(1): 41-54 Available from: URL: <http://www.wjgnet.com/1948-5182/full/v6/i1/41.htm> DOI: <http://dx.doi.org/10.4254/wjh.v6.i1.41>
8. Alvarez MA and Mukharjee D. Liver abnormalities in cardiac diseases and heart failure. *Int J Angiol*. 2011;20:135-142. DOI: <http://dx.doi.org/10.1055/s-0031-1284434>.ISSN 1061-1711.
9. Safran AP, Schaffner F. Chronic passive congestion of the liver in man. Electron microscopic study of cell atrophy and intralobular fibrosis. *Am J Pathol*. 1967 Mar;50(3):447-63. PMID: [6018673](https://pubmed.ncbi.nlm.nih.gov/6018673/); PMID: [PMC1965280](https://pubmed.ncbi.nlm.nih.gov/PMC1965280/).
10. Dunn GD, Hayes P, Breen KJ, Schenker S. The liver in congestive heart failure: a review. *Am J Med Sci*. 1973 Mar;265(3):174-89. doi: [10.1097/00000441-197303000-00001](https://doi.org/10.1097/00000441-197303000-00001). PMID: [4573728](https://pubmed.ncbi.nlm.nih.gov/4573728/).
11. vanDeursen VM, Damman K, Hillege HL, van Beek AP, van Veldhuisen DJ, Voors AA. Abnormal liver function in relation to hemodynamic profile in heart failure patients. *J Card Fail*. 2010 Jan;16(1):84-90. doi: [10.1016/j.cardfail.2009.08.002](https://doi.org/10.1016/j.cardfail.2009.08.002). Epub 2009 Sep 26. PMID: [20123323](https://pubmed.ncbi.nlm.nih.gov/20123323/).
12. Parmar KS, Singh GK, Gupta GP, Pathak T, Nayak E. Evaluation of De Ritis ratio in liver-associated diseases. *Int J Med Sci Public Health* 2016; 5: 1783-8. DOI: [10.5455/ijmsph.2016.24122015322](https://doi.org/10.5455/ijmsph.2016.24122015322)
13. Lau GT, Tan HC, Kritharides L. Type of liver dysfunction in heart failure and its relation to the severity of tricuspid regurgitation. *Am J Cardiol*. 2002 Dec 15;90(12):1405-9. doi: [10.1016/s0002-9149\(02\)02886-2](https://doi.org/10.1016/s0002-9149(02)02886-2). PMID: [12480058](https://pubmed.ncbi.nlm.nih.gov/12480058/).
14. Zhengri Lu, Gensen Ma, Lijuan Chen. Deritis Ratio is Associated with Mortality after Cardiac Arrest. *Hindawi Disease markers*. 2020;1-13. Volume 2020, Article ID 8826318, 13 pages <https://doi.org/10.1155/2020/8826318>