IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 10 Ver. 1 (October. 2018), PP 01-03
www.iosrjournals.org

Can serum lactate dehydrogenase be used as a disease severity biochemical marker in rheumatoid arthritis?

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Abstract:
Introduction:*Serum lactate dehydrogenase (S.LDH) is raised in many inflammatory disorders. Rheumatoid arthritis (RA) is a systemic inflammatory disease; S.LDH is expected to rise according to the severity of the disease. Synovial fluid total LDH and its isoenzymes are increased in RA as per some studies. The aim of the present study was to check synovial fluid LDH hypothesis in systemic circulation by testing total S. LDH level in RA patients and correlating it with the severity of the disease.*
Methods: *We have done a cross-sectional study of total 49 patients of rheumatoid arthritis after excluding cases of megaloblastic anaemia, malignancies, liver failure, cardiac failure, renal failure, severe osteoporosis, thyroid disorders and age below 18 years. CDAI and DAS 28 CRP were calculated, serum LDH level more than 3 times of mean normal value (288 IU) was considered as significantly raised.*
Results and conclusion: *Out of a total 49 patients 32 (65.31%) were female and themean age of the patient was 49.35 ± 7.75. As per CDAI Score, 22 (44.90%) patients were having a moderate disease with mean S.LDH of 485.03 IU and 27 (55.10%) patients were having severe disease with mean S. LDH 418.63 IU. As per DAS 28 CRP index 33(67.35%) patients were having moderate disease activity with mean S. LDH 445.37 IU and 16 (32.65%) patients were having severe disease with mean S.LDH of 454.35 IU. Serum LDH has no proportional rise in comparison to the severity of the disease. There is no correlation between 'DAS 28 CRP' and 'mean LDH' (r = -0.0406, p-value=0.7816); and 'CDAI' and 'mean LDH'' (r = -0.2017, p-value=0.1645). Total serum LDH is not a useful biochemical disease severity marker of RA.*
Key Words:*Serum lactate dehydrogenase, Disease severity marker, Rheumatoid arthritis*

Date of Submission: 20-09-2018 Date of acceptance: 08-10-2018

I. Introduction

RA is a very common inflammatory arthritis and it affects about 1% of the world population. American College of Rheumatology (ACR) 2010 classification criteria are used for definite diagnosis and staging of RA and to start disease modifying anti-rheumatic drugs (DMARDs) early in the course of the disease. In order to follow the progression of RA and for assessing the efficacy of therapy various scoring systems of the disease like simple disease activity index (SDAI), clinical disease activity index (CDAI), disease activity score (DAS) 28 CRP are routinely used in clinical practice [1-5]. Lactate dehydrogenase (LDH) enzyme is present in almost all tissues and it is required in the finalstep of anaerobic glycolysis. It is released during tissue injury and inflammation [6]. Inflammation in RA and RA like disorders is not restricted to joints and it affects many organs of the body so it is worth to study a inflammatory marker such as S.LDH which is involved in multi-system inflammations. [7] Serum LDH is also raised in certain anaemias, liver disease, acute myocardial infarction and different malignancies. Raised synovial fluid LDH level are linked with progressive joint damage in patients with rheumatoid arthritis (RA). Study of RA synovial fluid analysis demonstrated a significant rise in LDH 4 and LDH 5 isoenzymes. [2] LDH is released from dead and damaged cells into the synovial fluid and spread via the lymphatics from all inflamed joints into blood circulation. Raised serum LDH level mightreflect severity of joint inflammation and may be useful to monitor RAdisease activity and treatment. The objective of our study is to study total serum LDH as disease severity marker of Rheumatoid arthritis by comparing it with clinical disease activity index (CDAI) and DAS28 CRP.

II. Methods

We have done cross-sectional study of total 49 patients of rheumatoid arthritis as per ACR 2010 criteria from 15 April to 15 July 2017 at rheumatology clinic of a multi-speciality hospital in Ahmedabad, India. Patients having comorbid conditions like megaloblastic anaemia, malignancies, liver failure, cardiac failure, renal failure, severe osteoporosis, thyroid disorders and age below 18 years were excluded from the study. After taking consent forenrolment in the study, detail the clinical history and relevant investigations were done; and CDAI and DAS 28 CRP were calculated. Patients were categorised into different disease activity and S. LDH was measured. S.LDH more than 3 times of mean normal value (288 IU) was considered as significantly raised level. Statistical analysis was done by using SPSS 20 version and Pearson correlation coefficient test was used. Pearson coefficient (r) +1 with p-value<0.005 was considered significant for linear correlation.

III. Results

Out of the total 49 patients, 32 (65.31%) were female and 17 (34.69%) were male. Mean age of the patient was 49.35 ± 7.75. As per CDAI Score, 22 (44.90%) patients were having a moderate disease with Mean S.LDH of 485.03 IU and 27 (55.10%) patients were having severe disease with a mean S.LDH 418.63 IU. As per DAS 28 CRP index 33(67.35%) patients were having a moderate disease with mean S.LDH 445.37 IU and 16 (32.65%) patients were having severe disease with Mean S.LDH 454.35 IU.

Table-1: Distribution of patients according to their disease severity and measured mean serum LDH.

	Disease Severity			
	As per CDAI Score		As per DAS 28 Score	
	Moderate	Severe	Moderate	Severe
No. of Patients	22	27	33	16
Mean S.LDH	485.03	418.63	445.37	454.35

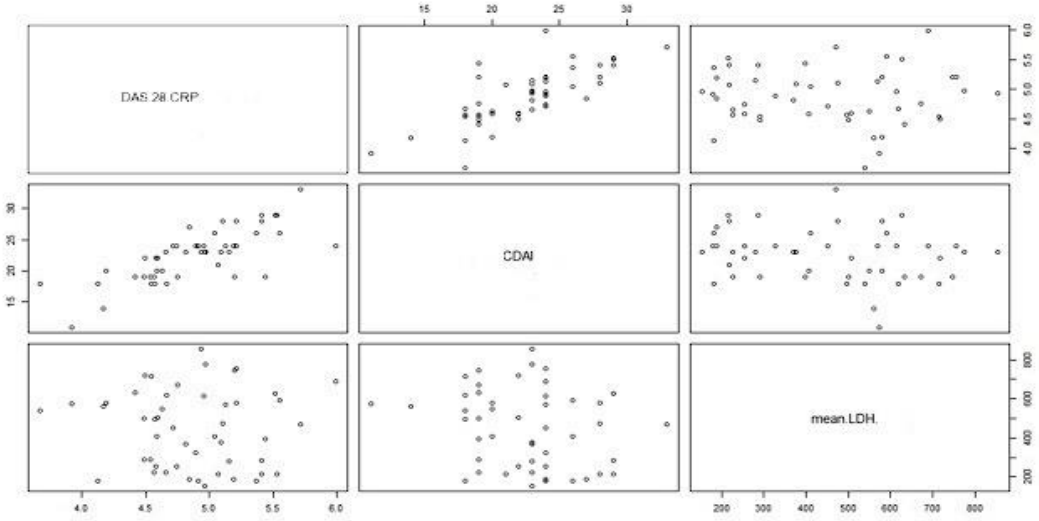
Table-2: Pearson correlation coefficients among CDAI, DAS28 CRP and mean LDH.

	DAS.28.CRP	CDAI	Mean S.LDH
DAS.28.CRP	1.0000	0.7571	-0.0406
Mean S. LDH	-0.0406	-0.2017	1.0000

Table-3: P-values of Correlation among CDAI, DAS28 CRP and mean LDH.

	DAS.28.CRP	CDAI	Mean S.LDH
DAS.28.CRP		3.084e-10	0.7816
CDAI			0.1645

Graph-1: Correlation among 'DAS 28 CRP', 'CDAI' and 'mean LDH'.



IV. Discussion

Our study showed a higher incidence of RA in female gender and it is matching with the study of other investigators. Serum LDH has no proportional rise compare to the severity of the disease. E MVeys et al and Pejovic M et al showed raised LDH in synovial fluid [8] There is no correlation between 'DAS 28 CRP' and 'mean LDH' (Pearson correlation coefficient = -0.0406, p-value=0.7816). There is a very weak negative correlation between 'CDAI' and 'mean LDH' which is statistically insignificant (Pearson correlation coefficient = -0.2017, p-value=0.1645). Previous studies were done for the synovial fluid level of total LDH and its isoenzymes [9] butthe same data may not be reflected in blood circulation as found in our study. Further studies comprising of comparison among various serum LDH isoenzymes and disease severity are required to evaluate various LDH isoenzymes as a disease severity biochemical marker of RA. Our study is having a small sample size so large sample size study of total serum LDH along with its isoenzymes is required to consolidate results of our study.

V. Conclusion

Total serum LDH is not a useful biochemical disease severity marker of RA as it has no correlation with severity of the disease.

Acknowledgements:
We are thankful to Indian Rheumatology Association (IRA) for selecting this project for UG Fellowship programme and providing 5000INR grant for conducting this research.

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Mukundkumar Patel".Can serum lactate dehydrogenase be used as a disease severity biochemical marker in rheumatoid arthritis?"IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 10, 2018, pp 01-03.