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TO DETERMINE WHETHER LACTATE DEHYDROGENASE OR HDL/MONOCYTE RATIO IS A BETTER PREDICTOR OF SEVERE ACUTE PANCREATITIS

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Abstract

Background: Acute pancreatitis is an inflammatory condition of the pancreas that may progress to systemic inflammatory response syndrome (SIRS) and multi-organ dysfunction syndrome (MODS), significantly increasing morbidity and mortality. Traditional laboratory markers such as amylase and lipase aid in diagnosis but fail to predict severity. Emerging biomarkers, including the High-Density Lipoprotein to Monocyte Ratio (HDL/MR) and serum Lactate Dehydrogenase (LDH), may provide valuable insights into disease severity.

Aim: To compare the reliability of HDL/Monocyte ratio and serum LDH in predicting the severity of acute pancreatitis.

Methods:

A cross-sectional study was conducted at Saveetha Medical College and Hospital in 2024 on 50 patients diagnosed with acute pancreatitis. Inclusion criteria were biliary or alcohol-induced acute pancreatitis presenting within 48 hours. Severity was assessed using Ranson's score (≥3 = severe). Blood samples were collected on admission to measure lipid profile, complete blood count, and serum LDH. Statistical analysis was performed using SPSS, with $p < 0.05$ considered significant.

Results: Among 50 patients, 33 had mild and 17 had severe acute pancreatitis. The mean HDL/Monocyte ratio was significantly lower in severe cases (0.033 ± 0.013) compared to mild cases (0.085 ± 0.026, $p < 0.01$). Serum LDH levels were markedly higher in severe cases (704.82 ± 563.43 U/L) than in mild cases (185.78 ± 48.39 U/L, $p < 0.001$). Both biomarkers showed strong statistical significance, with no major difference in predictive value.

Conclusion: Both HDL/Monocyte ratio and serum LDH are reliable predictors of severe acute pancreatitis. While LDH demonstrated greater variability, both markers can aid in early risk stratification. Larger multicenter studies are needed to validate cutoff values and integrate these markers into prognostic models for improved patient outcomes.

Keywords: Acute pancreatitis, HDL/Monocyte ratio, LDH, Ranson's score, Prognostic markers

INTRODUCTION

Acute pancreatitis is a severe and potentially life-threatening medical condition when the pancreas, a vital organ responsible for producing digestive enzymes, becomes inflamed and damaged by its digestive enzymes. This autoinflammation can lead to a range of severe complications if left untreated, including Systemic Inflammatory Response Syndrome (SIRS) and Multi-Organ Dysfunction Syndrome (MODS) [1,2].

SIRS is a life-threatening condition characterized by systemic inflammation, fever, tachycardia, and tachypnea, which can quickly progress to MODS if not treated promptly. MODS is a severe condition where multiple organs fail due to widespread inflammation, further increasing the risk of mortality [3].

Diagnosing acute pancreatitis typically relies on laboratory tests, including serum amylase and lipase levels. These tests help detect the presence of pancreatitis, but they do not provide any information about the severity of the disease [4,5]. This is where inflammatory markers come into play. Inflammatory markers are biomarkers that can help assess the severity of pancreatitis and predict the likelihood of complications [1].
In this study, researchers are investigating two specific inflammatory markers: the HDL (High-Density Lipoprotein) to Monocyte ratio and serum Lactate Dehydrogenase (LDH). HDL is a protein that plays a crucial role in removing excess cholesterol from the bloodstream, while Monocytes are a type of white blood cell involved in inflammation. The ratio of HDL to Monocytes can indicate inflammation in the body, providing valuable insights into the severity of pancreatitis [2,6].
Serum LDH is another important biomarker that measures the activity of an enzyme found in red blood cells. During inflammation, this enzyme becomes elevated in the bloodstream, making LDH a reliable indicator of tissue damage and inflammation [3,7,8]. By analyzing the levels of these inflammatory markers, researchers hope to understand the disease progression better and develop more effective treatment strategies for patients with acute pancreatitis.

AIM

The goal of this study is to determine which of these two markers is more reliable in predicting the severity of acute pancreatitis. By identifying the most accurate marker, healthcare providers can develop more effective treatment strategies and provide better care for patients with severe acute pancreatitis.

OBJECTIVES:

- To measure HDL/ monocyte ratio and serum LDH in patients presenting with acute pancreatitis.
- To identify patients presenting with severe acute pancreatitis based on Ranson's score.
- To measure the P value of HDL/ monocyte ration and serum LDH in differentiating between acute and severe acute pancreatitis.

STUDY DESIGN

This cross-sectional study was conducted at Saveetha Medical College and Hospital during the year of 2024.

STUDY POPULATION

Fifty patients diagnosed with acute pancreatitis based on serum amylase and lipase were selected for the study.

INCLUSION CRITERIA

- No previous history of pancreatitis
- The cause of pancreatitis must be either biliary or alcoholism
- The patient must be admitted within 48 hours of onset of symptoms

EXCLUSION CRITERIA

- Chronic Pancreatitis/ Acute on Chronic Pancreatitis, Recurrent Pancreatitis
- Minor causes of pancreatitis
- The patient has come to the hospital after 48 hours after onset of the symptoms

ETHICAL CONSIDERATION

- Institution Review Board approved the study
- Consent was obtained from all patients participating in the study.
- Patients' information was anonymized before analysis.

MATERIALS AND METHODOLOGY:

Research Methodology

The study involved collecting blood samples from patients upon admission to the hospital within 1 hour of arrival. This was done to ensure that the samples accurately reflected the patients' conditions at the time of admission without any potential changes or complications that might occur later.

The severity of acute pancreatitis was assessed using Ranson's score, a widely used clinical tool. Ranson's score is a numerical score that takes into account various factors, such as patient age, blood pressure, heart rate, and laboratory values (e.g., white blood cell count, and blood sugar levels). The higher the score, the more severe the acute pancreatitis.
In this study, a score of 3 and above indicated severe acute pancreatitis. According to this criteria, 17 out of the 50 patients studied were diagnosed with severe acute pancreatitis, while 33 were diagnosed with acute pancreatitis that was not considered severe.

Blood Tests Conducted
The following blood tests were performed on each patient:
1. Serum Lipid Profile: This test measures the levels of different lipids (fats) in the blood, including cholesterol, triglycerides, and high-density lipoprotein (HDL) cholesterol.
2. Complete Blood Picture (also known as Complete Blood Count or CBC): This test measures various blood components, including red blood cells, white blood cells, and platelets.
3. Serum Lactate Dehydrogenase (LDH): This enzyme is found in many tissues and organs and is often used as a marker for tissue damage or disease.
These tests were conducted to gather baseline data on the patient's conditions and to identify any potential correlations or associations with the outcome of interest.

Data Analysis
The collected data was organized using Microsoft Excel and analyzed using SPSS statistical analysis software. The HDL (high-density lipoprotein) to monocyte ratio was calculated for each patient.

Statistical Analysis
The means and standard deviations of the HDL/Monocyte ratios and the p-value were calculated. In statistical analysis, a p-value represents the probability that the observed difference between groups is due to chance rather than a natural effect.
In this study, a p-value of less than 0.05 was considered statistically significant, indicating that the observed difference is unlikely due to chance and may be attributed to a natural effect. This means that if the p-value is less than 0.05, it suggests a statistically significant association between the variables being studied.

RESULTS

Of the 50 people, 33 had acute pancreatitis, i.e., Ranson's score was less than 3, whereas 17 people had severe acute pancreatitis, i.e., Ranson's score was 3 or higher.

The mean HDL/ monocyte ratio in acute pancreatitis was 0.0853, with a standard deviation of 0.02582. The mean HDL to monocyte ratio in severe acute pancreatitis was 0.0331, with a standard deviation of 0.01313.
The mean Serum LDH for acute pancreatitis was 185.787 U/L with a standard deviation of 48.39 U/L.
The mean Serum LDH for severe acute pancreatitis was 704.823 U/L with a standard deviation of 563.43 U/L.
The p-value of the HDL/ monocyte ratio was <0/.01.
The p value of serum LDH was <0.001.

HDL/Monocyte Ratio

	Severity	N	Mean	Std. Deviation
HDL/ Monocyte	Acute Pancreatitis	33	.0853	.02582
	Severe Acute Pancreatitis	17	.0331	.01316

Significance of HDL/ Monocyte Ratio

	Equality of Variances		Equality of Means		
	F	Sig.	t	df	P value
HDL/ Monocyte	4.394	.041	7.813	48	<0.01

LDH

	Severity	N	Mean	Std. Deviation
LDH	Acute Pancreatitis	33	185.787	48.39664
	Severe Acute Pancreatitis	17	704.823	563.42504

Significance of LDH

	Equality of Variances		Equality of Means		
	F	Sig.	t	df	P value
LDH	51.597	.000	-5.306	48	<0.01

DISCUSSION

The study investigated the relationship between specific laboratory markers and the severity of acute pancreatitis. Specifically, the researchers looked at the mean High-Density Lipoprotein (HDL) to Monocyte ratio and the mean Serum Lactate Dehydrogenase (LDH) levels in patients with severe acute pancreatitis and acute pancreatitis.

The results showed that the mean HDL/Monocyte ratio was significantly lower in patients with severe acute pancreatitis (0.033) than in those with acute pancreatitis (0.085). Similarly, the mean serum LDH level was significantly higher in patients with severe acute pancreatitis (704.82 U/L) than in those with acute pancreatitis (185.78 U/L).

A P-value less than 0.05 is considered statistically significant, meaning the results are unlikely to occur by chance. In other words, the results suggest that the HDL/monocyte ratio and serum LDH level are not just a coincidence but are related to severe acute pancreatitis [2,3].

The p-value for HDL/Monocyte ratio and LDH levels was less than 0.001, indicating that both markers were strong predictors of severe acute pancreatitis. This means these markers can be used to identify patients at a higher risk of developing severe acute pancreatitis [6,7].

However, the researchers found no significant difference in their P-values when comparing the two variables. This means that both tests are equally valuable for diagnosing severe acute pancreatitis, but they may not provide additional information beyond what is already known from each other [8,9].

The results of this study are consistent with previous research by Johnsen et al., which found a p-value of 0.006 for the HDL/monocyte ratio as a predictor of the severity of acute pancreatitis [2]. Similarly, Dong-Ni Huang et al. found that LDH levels had a p-value of less than 0.05 when used as a predictor for complicated acute pancreatitis [3].

One important consideration when examining our study's results is the data's variability. Specifically, while the HDL/monocyte ratio and serum lactate dehydrogenase (LDH) levels showed statistical significance in distinguishing between patients with severe acute pancreatitis and controls, it's essential to note that serum LDH had a significantly more comprehensive range of values [10].

There are a few possible explanations for this finding. One possibility is that our study's low sample size may have contributed to this variability. However, it's also likely that serum LDH is inherently more variable than the HDL/monocyte ratio due to its dependence on multiple factors such as liver function, tissue damage, and inflammation [11,12].

Regardless of the reason, our findings suggest that further research with a larger sample size would be beneficial to confirm and extend these results. A more extensive study would allow us to understand better the distribution of serum LDH values in patients with acute pancreatitis and identify subgroups with distinct characteristics. Additionally, exploring the relationship between serum LDH and other clinical and laboratory variables could provide valuable insights into the pathophysiology of severe acute pancreatitis and enable the development of more effective treatment strategies [13–16].

CONCLUSION

The limited sample size of this study is a significant limitation that restricts the generalizability of the findings to the broader population. The small sample size may have introduced bias and variability, which could have impacted the reliability of the results. Therefore, it is crucial to conduct further research with a larger and more representative sample size to confirm the findings and increase confidence in the conclusions.

The study suggests that both HDL/monocyte ratio and serum lactate dehydrogenase (LDH) may be promising biomarkers for identifying severe acute pancreatitis. However, it is essential to validate which of these markers is more accurate and reliable for diagnosing this condition. Future studies should aim to compare the performance of these biomarkers in a larger cohort and investigate their optimal cutoff values for diagnosis [5,9].

Furthermore, additional research is necessary to refine our understanding of the relationships between HDLMR, serum LDH, and severe acute pancreatitis. This will require a comprehensive analysis of these biomarkers in combination with other clinical and laboratory parameters to develop a more comprehensive diagnostic approach. The findings of such studies will ultimately contribute to the development of more effective diagnostic and treatment strategies for severe acute pancreatitis, ultimately improving patient outcomes and reducing morbidity and mortality.

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