ORIGINAL ARTICLE

The effects of monocyte/high-density lipoprotein ratio on hospital stay in patients with mild acute pancreatitis

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Abstract

In this study, we aimed to evaluate the effect of monocyte/high-density lipoprotein (MHR), which is associated with systemic inflammation: on prolonged hospitalization in patients with mild acute pancreatitis. Patients hospitalized for acute edematous pancreatitis between 01.01.2021 and 31.12.2021 were retrospectively screened. Arrival Ranson scores of the patients were calculated. Those with a Ranson score <3 were considered as mild acute pancreatitis and were included in the study. Patients with mild acute pancreatitis were divided into 2 groups with a hospital stay of <8 days and ≥8 days. Monocyte/HDL, biochemical and metabolic parameters were compared between the groups. The study was conducted with a total of 39 patients, 23 male (59%) and 16 female (41%). While 28 (71.8%) of the patients were discharged within <8 days, 11 (28.2%) were hospitalized for ≥8 days. Group ≥8 days was considered as prolonged hospitalization. It was determined that the monocyte/HDL ratio was significantly higher in the group with prolonged hospitalization between the groups. In univariate analyzes, it was determined that the presence of Diabetes Mellitus and MHR increased the risk of prolonged hospitalization by 5.25 times and 1.085 times, respectively. In the multivariate analysis of these two parameters, MHR was found to be an independent risk factor for prolonged hospitalization. It was concluded that monocyte/HDL can be used as a simple and reliable parameter to predict the duration of hospitalization in patients with mild acute pancreatitis.

Keywords: Acute pancreatitis, monocyte/high-density lipoprotein ratio, prolonged hospital stay

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Introduction

Acute pancreatitis progresses with cellular damage and inflammation of the pancreas; It is a condition that can lead to local and systemic complications. It can be in a self-limiting mild edematous form; It can show a wide clinical course from severe form with multi-organ involvement that can lead to local and systemic complications [1]. Predicting the severity of acute pancreatitis and the prognosis of the disease contributes to the reduction of disease-related morbidity and mortality. Many scoring systems such as Ranson, APACHE II, Balthazar, Glasgow are used to determine the severity of acute pancreatitis. Ranson scoring is one of the important scoring methods that has been used for many years and gives information about the mortality rate [2].

Monocytes are cells that have an important role in cytokine synthesis. High-density lipoprotein (HDL) has an anti-inflammatory and antioxidant effect and has the effect of protecting the endothelium. The monocyte/HDL ratio has been widely used in recent years and has been shown as a new marker of inflammation(3).

Average length of stay in hospital in acute pancreatitis; It was determined as 4 days in mild severe forms and 9 days in severe pancreatitis [4]. Hospitalizations of 8 days or more are considered as prolonged hospitalization. In previous studies, the effects of diuretic, Angiotensin converting enzyme inhibitor (ACE) / Angiotensin receptor blocker (ARB) use, congestive heart failure, creatinine elevation, and fluid replacement given in the emergency department on the duration of hospitalization in patients with acute pancreatitis were investigated [5,6335 were included in the analysis. Baseline characteristics, determined by vital signs and laboratory parameters, were similar between the short and long hospitalization groups. However, the long hospitalization group received more intravenous crystalloid in the ED, and this group used more diuretics and more angiotensin-converting enzyme inhibitor and angiotensin-receptor blocker (ACEI/ARB]. There is no study evaluating the effect of monocyte/HDL, which is shown as a new inflammation marker in the literature, on the duration of hospitalization in acute pancreatitis. The aim of this study is to evaluate the effect of monocyte/HDL on prolonged hospitalization in acute pancreatitis.

Materials and Methods

Patients hospitalized with acute edematous pancreatitis between 01.01.2021-31.12.2021 in Afyonkarahisar Health Sciences University Faculty of Medicine Hospital Internal Diseases Clinic were retrospectively scanned from the hospital electronic file system. Hospitalization Ranson score of these patients; age >70 years, white blood cell (WBC) >18000 mm^3, glucose >220 mg/dL, lactate dehydrogenase (LDH) >400 U/L, aspartate aminotransferase (AST) >250 U/L parameters. Patients with a Ranson score below 3 were considered as mild pancreatitis and were included in the study. The patients included in the study were divided into two groups with a hospital stay of <8 days and ≥8 days. Monocyte/HDL and other parameters were compared between these two groups.

Statistical Analysis

SPSS 26.0 package program was used for statistical analysis. Categorical variables were presented as percentages and frequencies. Continuous variables were expressed as mean±standard deviation. Conformity of continuous variables to normal distribution was checked with the Kolmogorov Smirnov test. Chi-square test was used to compare categorical variables between groups. Continuous variables were compared with Mann Whitney U test or independent sample t test. Logistic regression analysis was used to identify risk factors for prolonged hospitalization. Parameters with significant differences between groups and parameters with $p<0.2$ in comparison between groups were included in the logistic regression. Parameters found to be risk factors for prolonged hospitalization in univariate logistic regression analysis were included in the multivariate analysis. All the p values presented were bidirectional and the values with $p<0.05$ were expressed as statistically significant.

This study was carried out according to the decision of Afyonkarahisar Health Sciences University Clinical Research Ethics Committee

dated 04.02.2022 and numbered 2022/85.

Results

The study was conducted with a total of 39 patients, 23 male (59%) and 16 female (41%). The mean age of the study group was 53.1±20.2 years. While 28 (71.8%) of the patients were discharged within <8 days, 11 (28.2%) were hospitalized for ≥8 days. When the groups were compared in terms of demographic characteristics, comorbidities and the drugs they used, it was found that diabetes was significantly more common in patients with prolonged hospitalization. The general characteristics of the patients, their comorbidities and the comparison of the drugs they use are presented in Table 1.

When the groups were compared in terms of laboratory parameters, it was found that leukocytosis was more prominent in the group with prolonged hospitalization and the monocyte/HDL cholesterol ratio was found to be significantly higher. Comparisons of the patients in terms of laboratory parameters are presented in Table 2.

In the univariate analyzes, it was found that the presence of DM and MHR increased the risk of prolonged hospitalization by 5.25 times and 1.085 times, respectively. In the multivariate analysis of these two parameters, MHR was found to be an independent risk factor for prolonged hospitalization. Table 3 shows the regression analysis to identify risk factors for prolonged hospitalization.

Discussion

Acute pancreatitis; it is one of the major reasons for hospitalization. With the various scoring systems used, the disease is classified according to its severity (mild, moderate, severe) and information about the prognosis can be obtained. In a community-based study in England, the average hospital stay for mild pancreatitis was found to be 4 days [4]. In some mild pancreatitis, this length of stay is much longer (≥8 days). The factors causing prolonged hospitalization in patients with mild pancreatitis have been tried to be revealed by previous studies. In this study, we aimed to investigate the effect of monocyte/HDL, which is used as a new generation inflammation

Table 1. Comparison of the patients' characteristics, comorbidities and the drugs they use.

Feature	Total (n= 39)	<8 days (n= 28)	≥8 days (n= 11)	p
Age (mean±SD)	53,1±20,2	50,1±20,6	60,7±17,7	0,143
Male gender (%-n)	59-23	57,1-16	63,6-7	1*
Ranson (mean±SD)	1±1,05	0,86±1,04	1,36±1,03	0,137
Diabetes mellitus (%-n)	35,9-14	25-7	63,6-7	**0,033***
Hypertension (%-n)	38,5-15	39,3-11	36,4-4	1*
Coronary artery disease (%-n)	10,3-4	7,1-2	18,2-2	0,562*
Heart failure (%-n)	7,7-3	3,6-1	18,2-2	0,187*
Chronic renal failure (%-n)	5,1-2	0	18,2-2	0,074*
ACE inhibitor (%-n)	20,5-8	14,3-4	36,4-4	0,188*
ARB (%-n)	7,7-3	10,7-3	0	0,545*
Diuretic (%-n)	23,1-9	17,9-5	36,4-4	0,238*
Calcium channel blocker (%-n)	20,5-8	21,4-6	18,2-2	1*
Metformin	17,9-7	14,3-4	27,3-3	0,379*
DPP-4 inhibitor (%-n)	10,3-4	10,7-3	9,1-1	1*
Insulin (%-n)	17,9-7	10,7-3	36,4-4	0,083*
Acetyl salicylic acid (%-n)	12,8-5	7,1-2	27,3-3	0,125

*Fisher's exact test

marker, on prolonged hospitalization in patients with mild pancreatitis.

Harkirat et al. In an article in which they evaluated the factors affecting prolonged hospitalization in patients with mild pancreatitis; prolonged hospitalization was observed in 20% of the patient group. Again, in this study, the effect of age, gender, and comorbidities of the patients on prolonged hospitalization could not be demonstrated. The most important risk factor for prolonged hospitalization has been shown to be persistence of pancreatitis-related symptoms and oral intolerance [6a subset of mild acute pancreatitis (AP]. In 11 (28%) of 39 patients in our study, hospitalization was prolonged and, similar to this study, the comorbidities of the patients were found to be similar between both

Table 2. Comparison of the patients in terms of laboratory parameters.

Parameter	Total (n= 39)	<8 days (n= 28)	≥8 days (n= 11)	p
Leukocytes (x109/uL)	11520±4260	11170±4013	12241±4929	**0,031**
Hemoglobin (gr/dL)	14,08±1,94	14,31±1,72	13,6±2,36	0,432
Platelets (x109/uL)	225,83±69,6	222,1±57,1	233,4±93,8	0,747
Amylase (U/L)	629,3±639,5	660,3±687,8	567,3±568,8	0,612
Lipase (U/L)	1455,8±2126,6	1610,7±2520,4	1146±1040,4	0,433
BUN (mg/dL)	18,27±26,3	18,86±32,1	17,1±7,6	0,567
AST (U/L)	79,9±222,3	105,6±271,2	28,6±16,2	0,842
Lactate dehydrogenase (U/L)	347,5±245,8	377,7±286,6	287,1±112,2	0,701
Calcium (mg/dL)	8,84±0,46	8,84±0,5	8,85±0,3	0,346
Glucose (mg/dL)	133,2±56,1	120,5±45,3	158,3±69,8	0,221
CRP (mg/L)	10,6±19,77	12,7±23,8	8,41±5,8	0,483
Absolute monocytes (x109/uL)	832,5±34,6	702,5±26,6	1092,5±355,2	**<0,001**
HDL cholesterol (mg/dL)	35,52±13,7	36,1±12,3	34,56±16,9	0,958
Monocyte/HDL ratio	26,73±15,2	21,28±10,9	37,63±17,1	**0,001**

Table 3. The results of the regression analysis performed to determine the risk factors for prolonged hospitalization.

Parameter	Univariate analysis		Multivariate analysis	
	RR (%95 GA)	p	RR (%95 GA)	p
Age	1,028 (0,990-1,067)	0,146		
Ranson	1,588 (0,809-3,119)	0,179		
DM	5,250 (1,175-23,457)	**0,03**	3,896 (0,639-23,766)	0,141
Heart failure	6,000 (0,485-74,289)	0,163		
KRF	50,2 (0-502,592)	0,999		
ACE inh.	3,429 (0,677-17,353)	0,136		
Insulin	4,762 (0,856-26,476)	0,075		
ASA	4,875 (0,689-34,499)	0,113		
Monocyte/HDL	1,085 (1,019-1,157)	**0,011**	1,082 (1,012-1,158)	**0,021**

DM: diyabetes mellitus, KRF: chronic renal failure ACE inh.: anjiyotensin converting enzym inhibitörs, ASA:acethylsalicylic acid

patient groups. Although it differed between diabetes patient groups, it was not found to be an independent risk factor in multivariate analysis.

In a study by Koçkan et al. investigating the determinants of prolonged hospitalization in patients with mild to moderate pancreatitis who applied to the emergency department, the use of diuretics was found to be higher in the group hospitalized long. Liver function tests and electrolytes were similar in both groups [5335 were included in the analysis. Baseline characteristics, determined by vital signs and laboratory parameters, were similar between the short and long hospitalization groups. However, the long hospitalization group received more intravenous crystalloid in the ED, and this group used more diuretics and more angiotensin-converting enzyme inhibitor and angiotensin-receptor blocker (ACEI/ARB). Unlike in our study, no effect of diuretic use on hospital stay was observed. Similar to this study, liver function tests and electrolytes were similar between the two groups.

In recent years, many articles aiming to show the relationship between hematological inflammation parameters and the severity of acute pancreatitis have been published [7,8]. Kaya et al. in a study conducted by 418 acute pancreatitis patients admitted to the emergency department were evaluated. In this study, the Ranson score and the platelet lymphocyte ratio (PLR) ratio at the time of admission to the emergency department were compared and it was shown that PLR is an independent factor in predicting the severity of the disease [7]. Han et al. in a study conducted by; A positive correlation was found between the neutrophil lymphocyte ratio (NLR), another inflammation parameter, and Ranson criteria [9and theirs utility for predicting severity of AP was evaluated by receiver operator characteristic (ROC]. In a study by Önmez et al., NLR was shown to be an independent risk factor in showing the severity of acute pancreatitis [8].

Monocyte/HDL is one of the new inflammation parameters frequently used in recent years [3]. In many previous studies, it can be a marker of inflammation and oxidative stress; it has been shown to be closely related to the presence and prognosis of some cardiovascular diseases [10,11]. In our study, in the patient group with prolonged hospitalization; monocyte/HDL was found to be statistically higher than the other group. In the regression analysis, it was seen that monocyte/HDL is an independent risk factor over the length of hospital stay in acute pancreatitis. This can be explained by the fact that monocytes play an active role in inflammation, an increase in the number of monocytes is expected, and HDL is an antioxidant type of cholesterol. Peng et al. in a study in which they measured HDL and apolipoprotein A-1 levels in patients with severe acute pancreatitis, they found that HDL level showed an inverse correlation with the severity of pancreatitis. In the same study, HDL was also shown to be low in patients with organ damage in acute pancreatitis [12]. In our study, HDL levels were similar between groups. This situation can be explained by mild pancreatitis in both groups.

The retrospective planning of our study, the small number of patients, and the evaluation of pancreatitis severity only by Ranson score are among the limitations of our study.

Conclusion

In conclusion, in mild acute pancreatitis, Monocyte/HDL may be helpful in predicting the length of stay in the hospital. There is a need for comprehensive prospective studies with more patient participation on this subject.

Conflict of Interest

No potential conflict of interest was reported by the authors.

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