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ORIGINAL ARTICLE

The Prognostic Role of In-Hospital Mortality Predictors and De Ritis Ratio in Patients with Upper Gastrointestinal System Bleeding

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ABSTRACT

Material-Method: In our tertiary hospital's intensive care unit, we studied the clinical and laboratory records of 243 patients who had been admitted with upper GIS bleeding between January 2018 and April 2022.

Results: Patients with upper gastrointestinal haemorrhage who were hospitalised were 65.8% male (M/F: 56/22). Mean age was 68.611.56 years old. One cutoff value was determined for the De Ritis ratio: 1.54. The mortality rate within the hospital was 13.1%..

Conclusion: Our results showed for the first time that the De Ritis ratio was not associated with in-hospital mortality in GI bleeding but further large clinical studies are needed to examine this issue.

INTRODUCTION

Bleeding in the upper gastrointestinal (GI) system is a potentially lethal illness that must be treated immediately. Although its mortality has decreased over the years with the introduction of proton pump inhibitor group drugs and the developments in endoscopic treatments, the mortality rate can reach 10% today. (1, 2) Thus, by separating the high-risk patient group from the lower-risk patient group, it was aimed to identify patients who require close monitoring and more careful follow-up, optimize their treatments, and so to reduce mortality.

GI bleeding mortality has been proven to be predicted by a number of factors, including advanced age, chronic liver illness, chronic kidney insufficiency, advanced cancer, low haemoglobin levels, and heart failure (3-7). Today, the use of biomarkers to accelerate diagnostic processes and predict prognosis becomes widespread and clinical studies on new biomarkers increase day by day. These markers are expected to assist the clinician in predicting the patient's risk and prognosis. It is thought that the ALT value is mostly related to liver-related pathologies and its increased level reflects the dysfunction of liver cells. On the other hand, it has been observed that AST increases in blood not only in liver cell dysfunction. (8, 9)

"De Ritis" ratio is defined as the ratio of serum AST level to ALT level and is a parameter whose relationship with prognosis has been evaluated in different patient groups (10-19)/

A high De Ritis ratio has never been studied in relation to gastrointestinal bleeding mortality in a clinical setting, to our knowledge.

An investigation into the risk factors for in-hospital mortality in patients with GIS bleeding and an investigation into the association between the De Ritis ration and GI bleeding mortality are two objectives of this study.

METHODS

Records of the patients who had been hospitalized with upper GI bleeding and had been given treatment in the intensive care unit of our hospital between January 2018 and April 2022 were evaluated retrospectively. Patients with lower GI bleeding, younger than 18 years old, or voluntarily discharged from the hospital before their treatment is completed had been excluded from the study. Patients 18 years and older with a definite diagnosis of upper GI bleeding and who completed their treatment in our hospital until discharge or death were included. APACHE score at the time of intensive care unit admission, laboratory parameters at time of admission (white blood cell count, hemoglobin, ALT level, AST level, platelet count, primary ratio (INR) nor international, albumin level), red blood cell unit transfusion, duration of intensive care unit stay and mortality data were recorded and analyzed.

The primary endpoint was in-hospital mortality and it was defined as mortality that occurred because of upper GI bleeding after diagnosis and during a hospital stay.

Statistical analyses: SPSS version 22 was used for the statistical analysis. The Kolmogorov-Smirnov test was used to examine the Kolmogorov-Smirnov distribution of categorical variables. For categorical variables, the Chi-squared or Fisher tests were used, while for continuous variables, the Mann Whitney U or Student t tests were used. Logistic regression analyses were performed to search for the correlation of the current variables with in-hospital mortality.

RESULTS

As a result, the study's inclusion criteria resulted in the enrollment of 243 patients. The average age of the participants was 68.8 years, and 65.8% of them were men. APACHE scores at admission averaged 17(10) points, with a median stay in the intensive care unit of 2(2) days. The in-hospital mortality rate was 13.1%. Variceal bleeding accounted for 23.1% of all upper GI bleeding. The most encountered comorbid diseases in the study population were hypertension (55.1%), coronary artery disease (40.3%), diabetes mellitus (36.2%), chronic liver failure (22.2%), and chronic renal insufficiency (18.9%).

Comparing survivors and non-survivors in the terms of clinical and laboratory characteristics male gender, variceal bleeding, chronic renal insufficiency, and chronic hepatic failure were more prevalent in non-survivors. While APACHE score, white blood cell count, and INR were higher in non-survivors, albumin level was higher in survivors. (Table 1)

Table 1: Surviving and non-surviving patients' clinical and analytical characteristics

Variables	Survivors (n=211)	Non-survivors (n=32)	P value
Age, years	68 (17.5)	70 (14.75)	0.514
Gender, female/male	77 /134	6 /26	0.049 *
ICU length of stay, days	2 (2)	2 (3.75)	0.073
Variceal /Nonvariceal bleeding	42 /168	12 /12	0.001*
APACHE score	16 (9)	24 (9.75)	0.000*
Hypertension	118	16	0.530
Diabetes mellitus	76	12	0.871
Coronary artery disease	88	10	0.261
Chronic renal insufficiency	34	12	0.004*
Chronic hepatic failure	42	12	0.026*
Chronic obstructive pulmonary disease	17	6	0.095
Cerebrovascular accident	25	1	0.217
Neoplastic disease	34	6	0.708
Hemoglobin level, g/dL	8.63 ± 2.550	8.92 ±1.956	0.568
White blood cell count, $x10^9$ L	9.7(6.17)	12.75 (9.64)	0.002*
Platelet count, $x10^9$ L	214.0(128.3)	183.4 (98.9)	0.388
Aspartate aminotransferase level, U/L	20 (16)	22.5 (31.75)	0.074
Alanine aminotransferase level, U/L	15 (14)	18.5 (26.5)	0.349
De Ritis ratio	1.27 (0.710)	1.5 (0.675)	0.058
Albumin level, g/dL	3.09 ±0.597	2.49 ±0.569	0.000*
International Normalized Ratio level	1.16 (0.310)	1.43 (0.898)	0.000*
Red blood cell unit transfusion	2 (3)	2(3)	0.582

The count was used to represent categorical variables, while the mean, standard deviation, and median were used to represent continuous variables when the distribution was normal, and the interquartile range was used when the distribution was aberrant.

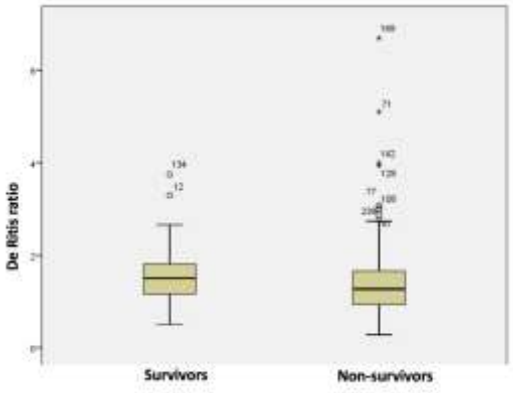

Figure 1: Box plot of the De Ritis ratio in survivors and non-survivors.

It was determined that a cut-off value of 1.57 distinguished the low from the high De Ritis groups. (Picture No. 2) Variceal haemorrhage and chronic hepatic failure were more common.

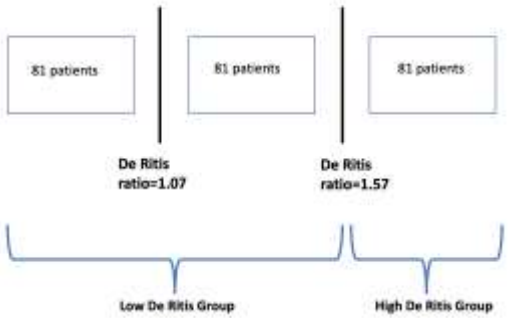

Figure 2: The diagram presents grouping according to the De Ritis ratio.

Table 2: The De ritis ratio was used to classify the patients' clinical and laboratory data.

Variables	De Ritis ratio < 1.57 (n=162)	De Ritis ratio ≥ 1.57 (n=81)	P value
Age, years	68 (16)	69.5 (17)	0.067
Gender, male	111	49	0.214
Intensive care unit length of stay, days	2 (2)	2 (2)	0.614
Variceal bleeding	27	27	0.002*
APACHE score	17 (10)	17 (10)	0.067
Hypertension	90	44	0.855
Diabetes mellitus	64	24	0.131
Coronary artery disease	67	31	0.644
Chronic renal insufficiency	28	18	0.354
Chronic hepatic failure	28	26	0.009*
Chronic obstructive pulmonary disease	18	5	0.215
Cerebrovascular accident	17	9	0.883
Neoplastic disease	24	16	0.328
Hemoglobin level, g/dL	8.85 ±2.558	8.36 ±2.298	0.145
White blood cell count, x10^9 L	10.370 (6.880)	9.625(6.123)	0.294
Platelet count, x10^9 L	217.0 (12.185)	182.5 (13.952)	0.069
Aspartate aminotransferase level, U/L	17 (13)	27 (33)	0.000*
Alanine aminotransferase level, U/L	17 (14)	13 (14)	0.005*
Albumin level, g/dL	3.06 ±0.642	2.88 ±0.580	0.038*
International normalized ratio level	1.14 (0.23)	1.345 (0.54)	0.000*
Red blood cell unit transfusion	2 (3)	2 (3)	0.761
Survivor/Non-survivor	144/18	67/14	0.180

Categorical variables were given as count; continuous variables were given as mean ±standart deviation with normal distribution and as median (interquartile range) with the abnormal distribution.

Logistic regression analyses showed that the risk of mortality increased with a high APACHE score (p=0.000) and the presence of chronic renal insufficiency (p=0.012). On the other hand high albumin level (p=0.007) and having coronary artery disease (0.043) were found to decrease the risk of mortality. The De Ritis ratio was not correlated with mortality risk. (Table 3)

Table 3: Logistic regression analyses showing odds ratios for the current variables.

Variables	OR (95% CI)	P value
Age	0.998 (0.951-1.047)	0.932
Gender, male	0.499 (0.145-1.722)	0.271
Intensive care unit length of stay	0.774 (0.556-1.0779	0.129
APACHE score	0.858 (0.789-0.932)	0.000*
Hypertension	1.026 (0.317-3.319)	0.966
Diabetes mellitus	1.637 (0.523-5.120)	0.397
Coronary artery disease	3.612 (1.042-12.528)	0.043*
Chronic renal insufficiency	0.208 (0.061-0.712)	0.012*
Chronic hepatic failure	1.406 (0.379- 5.215)	0.611
Chronic obstructive pulmonary disease	0.259 (0.057-1.182)	0.081
Cerebrovascular accident	2.644 (0.259-26.973)	0.412
Neoplastic disease	2.221 (0.546-9.035)	0.265
Hemoglobin level	0.787 (0.574-1.077)	0.135
White blood cell count	1.000 (1.000-1.000)	0.596
Platelet count	1.000 (1.000-1.000)	0.715
Aspartate aminotransferase level	0.996 (0.988- 1.003)	0.262
Alanine aminotransferase level	1.008 (0.995-1.022)	0.225
De ritis ratio	0.871 (0.359-2.111)	0.760
Albumin level	3.883 (1.438-10.484)	0.007*
International normalized ratio level	0.963 (0.840-1.103)	0.586
Red blood cell unit transfusion	1.083 (0.715-1.641)	0.706

DISCUSSION

Our findings are at odds with other studies that have identified a link between the De Ritis ratio and an increased risk of dying young. To date, the De Ritis ratio has been associated to a variety of adverse outcomes, including radiation-induced mortality in COVID 19 patients (13), peripheral artery disease (14), and the prognosis of bladder cancer patients following radical cystectomy (12, 14) A meta-analysis concluded that preoperatively decreased De Ritis ratio in urothelial carcinomas was associated with poor prognosis. (15) It was found that the increased De Ritis ratio at admission in acute ischemic stroke patients had a negative effect on clinical outcomes in the 3rd month. (16).

Wang et al. examined the medical records of patients with severe burns who had been admitted between May 1, 2005, and April 30, 2018. (25) The De Ritis ratio can now be used to predict the fate of burn victims, according to the findings of this study. Following burn surgery, the De Ritis ratio was found to be a major predictor of death (26). The AST/ALT ratio was demonstrated to be a predictor of PLA in a study including 240 participants (27). Polymyositis/dermatomyositis De Ritis ratio-related interstitial lung disease was associated with a greater mortality rate in a cohort study of 522 participants (28). An association between the De-Ritis ratio and post-CA mortality in the intensive care unit and hospital was discovered by Lu et al. in a study of 374 adult cardiac arrest patients (8). De Ritis ratio was recently discovered to be associated with death in 322 COVID-19 patients (29). De Ritis ratios are associated with greater mortality rates in the 90-day postoperative interval following cardiovascular surgery (30). Researchers used different cutoff values for De Ritis, a ratio that indicates a patient's prognosis or death. According to earlier study, healthy people's De Ritis ratios can range from 0.7 to 1.4. (19).

In our study, consistent with the literature, high albumin levels and coronary artery disease were found to decrease the risk of mortality. In recent years, low serum albumin levels have been mortality and a risk factor for other adverse outcomes has been shown. (36) This result supports the decrease in the mortality rate of the high albumin level detected in our study. On the other hand,

we think that this difference in our study is due to the systemic regulatory effects of anticoagulants and other drugs used for coronary artery disease. In our study, in addition to the male gender, concomitant esophageal variceal bleeding, chronic renal failure, and chronic liver failure are among the variables that increase mortality rates.

CONCLUSION

Many studies in the literature demonstrated that the De Ritis ratio has prognostic value for different diseases. Our results showed for the first time that the De Ritis ratio was not associated with in-hospital mortality in GI bleeding but further large clinical studies are needed to examine this issue. Accordingly, we think that it will be a useful reference for different studies investigating the prognostic role of the De Ritis rate.

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