

The Relationship between Blood Groups and Mortality in Patients with Acute Pancreatitis

Ilkay Güler,¹ İzzet Ustaalioglu²

¹Republic of Türkiye, Ministry of Health, General Directorate of Public Hospitals, Ankara, Türkiye

²University of Health Sciences Turkey, Kartal Dr. Lütfi Kırdar City Hospital, Clinic of Emergency Medicine, İstanbul, Türkiye

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Correspondence: İzzet Ustaalioglu, Kartal Dr. Lütfi Kırdar City Hospital, İstanbul, Türkiye

E-mail: izzetustaalioglu@gmail.com



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ABSTRACT

Objective: The potential association between blood group and outcomes in acute pancreatitis has not been adequately explored. This study aimed to investigate the relationship between blood group and in-hospital mortality in patients diagnosed with acute pancreatitis.

Methods: We conducted a single-center, retrospective study reviewing the medical records of patients diagnosed with acute pancreatitis between 2022 and 2023. Patient demographics, blood group type, disease severity, and in-hospital mortality were recorded. The correlation between blood group and in-hospital mortality was examined.

Results: The blood group distribution among the acute pancreatitis patients was as follows: O: 31.3%, A: 49.2%, B: 16%, and AB: 3.5%. Mortality rates varied across the blood groups, with Group O having the highest mortality (8.3%), followed by Groups B (4.1%) and A (3.3%).

Conclusion: Our preliminary findings suggest a potential association between blood group and mortality in acute pancreatitis, with blood group O associated with a higher mortality rate. However, due to the limitations inherent in the study's retrospective design, these findings should be validated in future prospective studies. Understanding the role of blood group in the prognosis of acute pancreatitis could provide valuable insights into the disease's pathophysiology and contribute to improved risk stratification and patient management.

INTRODUCTION

Acute pancreatitis, characterized by the inflammation of the pancreas, is a potentially life-threatening condition that has been associated with a significant global burden.^[1] The etiology of acute pancreatitis is multifactorial, encompassing factors such as alcohol consumption, gallstones, metabolic disorders, and certain genetic predispositions. Although the majority of cases are mild and self-limiting, approximately 20% of patients develop a severe form of the disease, leading to significant morbidity and mortality.^[2-5]

Despite advancements in diagnostic capabilities and treatment modalities, the mortality rate in severe acute pancreatitis remains relatively high.^[5-8] This highlights the necessity to understand the potential predictors of poor outcome in acute pancreatitis, including patient characteristics, clinical features, and laboratory markers.

One such potentially predictive characteristic is blood group, a hereditary trait determined by antigens present

on the surface of red blood cells. The previous research has hinted at potential associations between certain blood groups and the incidence or severity of various diseases, including cardiovascular disorders, gastrointestinal diseases, and certain malignancies.^[9-12] In particular, the ABO blood group systems have been the focal point of many such studies. However, the role of blood groups in the prognosis of acute pancreatitis remains inadequately explored. The potential link between blood group and mortality in acute pancreatitis could help provide a better understanding of the disease's pathophysiology, identify high-risk patients more accurately, and guide the development of more targeted therapeutic strategies.

This study aims to delve into the potential correlation between the patient's blood group and the mortality rate in acute pancreatitis, reviewing existing literature and presenting original research. The insights generated from this study may contribute significantly to the current understanding of the disease, facilitating more personalized patient management and potentially improving survival rates.

MATERIALS AND METHODS

This study was conducted at Kartal Dr. Lütfi Kırdar City Hospital and followed the ethical guidelines of the Declaration of Helsinki. Approval was obtained from the Institutional Review Board of Kartal Dr. Lütfi Kırdar City Hospital. Informed consent was not required for this retrospective chart review study. Patient data were anonymized to protect confidentiality. The medical records of patients aged 18 years and above, who were diagnosed with acute pancreatitis between January 2022 and January 2023, were reviewed. The diagnosis of acute pancreatitis was based on specific criteria including severe, persistent pain, elevated levels of amylase or lipase, and characteristic imaging findings.^[13] Demographic information such as age and sex, ABO blood group type, etiology of pancreatitis, and the need for ICU admission was collected from each patient's medical records. Laboratory parameters at admission, including amylase levels, complete blood count, liver function tests, and renal function tests, were also recorded. The primary outcome measured was in-hospital mortality.

Statistical Analysis

Statistical analysis involved presenting continuous variables as mean \pm standard deviation and categorical variables as frequencies or percentages. Student's t-test or Mann-Whitney U test was used to compare continuous variables between groups, while Chi-square or Fisher's exact test was used for categorical variables. The results were re-

ported as odds ratios with 95% of confidence intervals. $p < 0.05$ was considered statistically significant. The statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA).

RESULTS

The study was completed with 307 patients. Of the patients, 178 (58%) were female, with a mean age of 58.53 ± 16.15 years. The cause of AP was biliary in 285 (92.8%) of the patients. Sixteen (5.2%) patients were admitted to the ICU. There was no significant correlation between the comorbidity and laboratory data of the patients and their blood groups. In-hospital mortality was detected in 15 (4.9%) of the patients (Tables 1 and 2).

The blood group distribution of the AP patients included in the study was as follows; O:31.3%, A:49.2%, B:16%, and AB:3.5% (Figure 1).

The blood group distribution of the patients with mortality was as follows; O: 8.3% A: 3.3% B: %4.1, and AB: 0% (Figure 2).

DISCUSSION

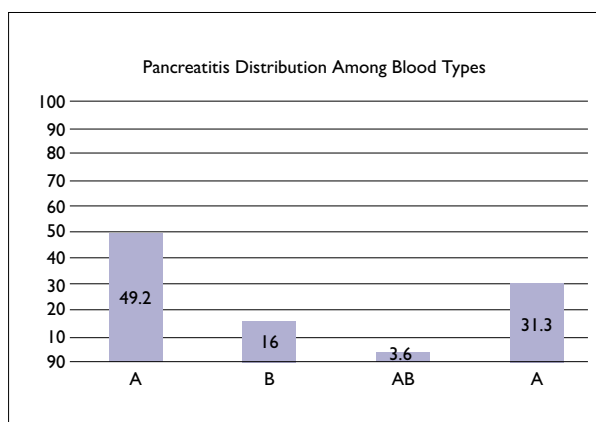
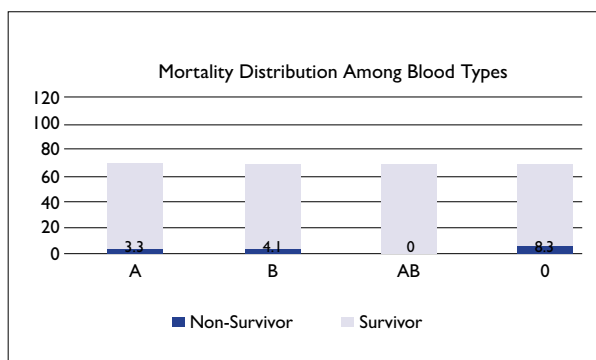
Our single-center, retrospective study aimed to investigate the potential association between ABO and Rh blood group types and in-hospital mortality in patients diagnosed with acute pancreatitis. The distribution of blood groups in our acute pancreatitis patient population was somewhat

Table 1. Distribution of Some Features of O and Other Blood Groups

| | | Blood group | | |
|---------------------------------------|---------------------|-------------|------------|------------|
| | | 0 | Others | Total |
| | | Number (%) | Number (%) | Number (%) |
| Gender | Woman | 56 (58.3) | 122 (57.8) | 178 (58.0) |
| | Man | 40 (41.7) | 89 (42.2) | 129 (42.0) |
| Etiology | Non-Biliary | 9 (9.4) | 13 (6.2) | 22 (7.2) |
| | Biliary | 87 (90.6) | 198 (93.8) | 285 (92.8) |
| Treatment Unit | Inpatient Unit | 92 (95.8) | 199 (94.3) | 291 (94.8) |
| | Intensive Care Unit | 4 (4.2) | 12 (5.7) | 16 (5.2) |
| Hypertension | Present | 40 (41.7) | 81 (38.4) | 121 (39.4) |
| Diabetes Mellitus | Present | 30 (31.6) | 46 (21.8) | 76 (24.8) |
| Coronary Artery Disease | Present | 11 (11.6) | 23 (10.9) | 34 (11.1) |
| Conjestic Heart Failure | Present | 1 (1) | 6 (2.8) | 7 (2.3) |
| Atrial Fibrillation | Present | 0 (0) | 5 (2.4) | 5 (1.6) |
| Hyperlipidemia | Present | 4 (4.2) | 1 (0.5) | 5 (1.6) |
| Malignancy | Present | 5 (5.2) | 13 (6.2) | 18 (5.9) |
| Chronic Renal Failure | Present | 9 (9.4) | 14 (6.6) | 23 (7.5) |
| Cerebrovascular Disease | Present | 4 (4.2) | 3 (1.4) | 7 (2.3) |
| Chronic Obstructive Pulmonary Disease | Present | 8 (8.3) | 18 (8.5) | 26 (8.5) |
| Mortality | Survivor | 88 (91.7) | 203 (96.7) | 291 (94.8) |
| | Non-survivor | 8 (8.3) | 7 (3.3) | 15 (4.9) |

Table 2. Some features of O and other blood groups

| | O | Others | Total |
|---------------------------------|------------------|------------------|-----------------|
| | Mean±SD | Mean±SD | Mean±SD |
| Age | 57.32±16.35 | 59.08±16.07 | 58.53±16.15 |
| Hospital stay | 4.14±2.93 | 4.37±3.73 | 4.30±3.49 |
| Systolic blood pressure (mmHg) | 133.35±21.47 | 130.22±22.08 | 131.20±21.90 |
| Diastolic blood pressure (mmHg) | 77.82±13.17 | 78.87±40.48 | 78.54±34.33 |
| Pulse rate (min) | 81.76±13 | 80.88±14.58 | 81.16±14.09 |
| Respiratory rate (min) | 16.03±2.61 | 15.93±2.55 | 15.96±2.56 |
| Fever (°C) | 36.62±0.49 | 36.71±0.58 | 36.68±0.55 |
| White blood cells (103u/L) | 10128.77±4676.76 | 10110.86±4975.23 | 10116.5±4875.58 |
| Hemoglobin (gr/dl) | 11.71±1.83 | 11.95±1.84 | 11.87±1.83 |
| Lymphocyte (103/mm3) | 1.44±0.76 | 1.51±0.96 | 1.49±0.90 |
| Platelet (103u/L) | 226.1±86.94 | 212.08±77.7 | 216.49±80.84 |
| Albumin (g/L) | 35.47±5.21 | 36.27±3.94 | 36.02±4.39 |
| Blood urea nitrogen (mg/dl) | 30.76±22.43 | 29.54±25.43 | 29.92±24.50 |
| Creatinine (mg/dl) | 1.07±1.52 | 0.97±1.27 | 1.00±1.35 |
| ALT(u/L) | 146.07±136.96 | 169.54±153.54 | 162.25±148.76 |
| AST(u/L) | 96.82±83.55 | 129.1±191.08 | 119.01±165.68 |
| Amylase (u/L) | 735.92±762.52 | 636.21±667.77 | 667.49±699.15 |
| Total-bilirubin (mg/dl) | 1.86±2.06 | 2.2±8.16 | 2.09±6.86 |
| Direct-bilirubin (mg/dl) | 1.97±7.04 | 1.2±2.13 | 1.44±4.31 |
| Glucose (mg/dl) | 100.21±44.07 | 97.82±33.36 | 98.57±36.98 |
| LDH (u/L) | 340.7±174.81 | 309.02±138.02 | 318.93±150.92 |

**Figure 1.** Pancreatitis distribution by blood groups.**Figure 2.** Mortality distribution by blood groups.

different from the general population, with a higher prevalence of blood group A (49.2%) and a relatively lower prevalence of blood group O (31.3%).

Interestingly, our results suggest a possible correlation between blood group type and mortality in patients with acute pancreatitis. Mortality rates were notably higher in patients with blood group O (8.3%) compared to those with blood group A (3.3%) and B (4.1%). This is a key observation that potentially implicates blood group type as a factor in the prognosis of acute pancreatitis, a relationship that has been explored in various other diseases but is relatively under-investigated in the context of acute pancreatitis.

The mechanisms underlying the potential link between blood group and mortality in acute pancreatitis remain uncertain and require further investigation. The previous studies have suggested that differences in antigenic structures on the surface of red blood cells, associated with the ABO blood group system, may influence inflammatory and immune responses, coagulation pathways, and vascular function, all of which could potentially impact the progression and outcomes of acute pancreatitis.^[4,15]

However, it is important to note that our study is observational and retrospective in nature. Therefore, although we were able to identify an association, we cannot infer causality. Further, the single-center design and the relatively limited sample size could affect the generalizability

of our findings. Hence, larger prospective studies and experimental models are warranted to verify these findings and explore the underlying mechanisms.

In addition, while our findings suggest a potential role for blood group in predicting outcomes in acute pancreatitis, it should be underscored that this factor should be considered in conjunction with other established prognostic factors such as disease severity, comorbidities, and etiology. The integration of these multiple factors into a comprehensive risk stratification tool may help optimize clinical decision-making and patient management in acute pancreatitis.

The blood group distribution of the AP patients included in the study was as follows; O:31.3%, A:49.2%, B:16%, and AB:3.5%. When the distribution in Turkey is examined, it is seen that the distribution of A, O, B, and AB blood groups is 42.84%, 32.67%, 16.46%, and 8.03%, respectively. Accordingly, our results are compatible with the literature.^[16]

This study has several limitations that should be acknowledged. First, as this was a single-center, retrospective study, the findings might be subject to selection bias, and their generalizability may be limited. The blood group distribution and the mortality rates of acute pancreatitis might vary in different populations and geographical locations. Second, the sample size was relatively small, which reduces the power of the study to detect significant associations and may limit the robustness of the statistical analysis. This is especially true for rarer blood groups, such as AB, which constituted a small proportion of our study population.

Third, we were unable to account for some potentially significant confounding factors due to the retrospective nature of the study. These include the precise timeline of disease progression, the use of specific therapeutic interventions, lifestyle factors such as smoking and alcohol consumption, and detailed nutritional status of the patients. Fourth, the lack of long-term follow-up data prevents us from making any conclusions about the effect of the blood group on long-term mortality or recurrent episodes of acute pancreatitis. Finally, while our study suggests a correlation between blood group and mortality in acute pancreatitis, it does not provide insights into the underlying biological mechanisms. Future studies incorporating in-depth molecular and genetic analysis are needed to elucidate the potential pathophysiological mechanisms behind this association.

Conclusion

This study provides preliminary evidence for a potential link between blood group type and mortality in acute pancreatitis, with a higher observed mortality rate among patients with blood group O. If these findings are confirmed and expanded on in future research, they may contribute to a more nuanced understanding of the disease's pathophysiology and potentially guide the development of more personalized therapeutic strategies.

Ethics Committee Approval

This study approved by the Kartal Dr. Lütfi Kırdar City Hospital Clinical Research Ethics Committee (Date: 29.03.2023, Decision No: 2023/514/246/15).

Informed Consent

Retrospective study.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept: İ.G., İ.U.; Design: İ.G., İ.U.; Supervision: İ.G.; Fundings: İ.G.; Materials: İ.U.; Data: İ.U.; Analysis: İ.G., İ.U.; Literature search: İ.U.; Writing: İ.G., İ.U.; Critical revision: İ.G., İ.U.

Conflict of Interest

None declared.

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Akut Pankreatitli Hastalarda Kan Grupları ve Mortalite Arasındaki İlişki

Amaç: Kan grubu ile akut pankreatit sonuçları arasındaki potansiyel ilişki yeterince araştırılmamıştır. Bu çalışma, akut pankreatit tanısı alan hastalarda kan grubu ile hastanede mortalite arasındaki ilişkiyi incelemeyi amaçlamıştır.

Gereç ve Yöntem: 2022 ve 2023 yılları arasında akut pankreatit tanısı alan hastaların tıbbi kayıtlarını inceleyen tek merkezli, retrospektif bir çalışma gerçekleştirdik. Hastaların demografik bilgileri, kan grupları, hastalığın şiddeti ve hastanede mortalite kaydedildi. Hastaların kan grubu ile hastane içi mortalitesi arasındaki ilişki incelendi.

Bulgular: Akut pankreatit hastaları arasında kan grubu dağılımı şu şekildedeydi: O: %31.3, A: %49.2, B: %16 ve AB: %3.5. Mortalite oranları kan grupları arasında değişiklik göstermiş, grup O en yüksek mortaliteye (%8.3) sahipken, onu grup B (%4.1) ve grup A (%3.3) takip etti.

Sonuç: Bulgularımız, kan grubu ile akut pankreatit mortalitesi arasında potansiyel bir ilişki olduğunu göstermekte, kan grubu O'nin daha yüksek bir mortalite oranı ile ilişkili olduğunu düşündürmektedir. Ancak, çalışmanın retrospektif tasarımına ait kısıtlamalar nedeniyle, bu bulguların gelecekteki prospektif çalışmalarda doğrulanması gerekmektedir. Akut pankreatit prognozunda kan grubunun rolünü anlamak, hastalığın patofizyolojisine değerli katkılar sağlayabilir ve daha iyi risk değerlendirmesi ve hasta yönetimine katkıda bulunabilir.

Anahtar Sözcükler: Akut pankreatit; kan grubu; mortalite.