Clinical characteristics, outcomes, and prognostic factors of patients with systemic rheumatic diseases in medical intensive care unit: A retrospective single center study

Medikal yoğun bakım ünitesinde takip edilen sistemik romatolojik hastalığı olan hastaların klinik özellikleri, sonuçları ve prognostik faktörleri: Retrospektif tek merkezli çalışma

Tuba Demirci Yıldırım[1], Süleyman Yıldırım[2], Cenk Kıraklı[2]

[1] Department of Internal Medicine, Faculty of Medicine, Division of Rheumatology, Dokuz Eylül University

[2] Intensive Care Unit, Dr. Suat Seren Chest Disease and Surgery Training and Research Hospital, İzmir School of Medicine, University of Health Sciences

Abstract

Aim: Systemic rheumatic diseases are a group of diseases that can affect several organs and occasionally need intensive care unit (ICU) admission due to the severity of diseases or complications. In this study, we aimed to investigate clinical features and factors associated with mortality in patients with systemic rheumatic diseases who were followed up in the medical ICU

Methods: This retrospective cohort study was conducted at a medical ICU, between January 1, 2018, and December 31, 2022. Patients who were 18 years older and with known or newly diagnosed systemic rheumatic diseases who were followed up in the ICU for more than 48 hours were included in the study. The cause of admission, clinical characteristics, and factors associated with mortality were evaluated.

Results: A total of 76 patients were included in the final analysis; the mean age was 60,8±15.0 years and rheumatoid arthritis (RA) (39%) was the most common systemic rheumatic disease. Acute respiratory failure (64%) was the most common reason for ICU admission, followed by septic shock (16%). A total of 41 (54%) patients died during their ICU stay. Non-survivor patients were older (mean age, 66.1 vs. 54.8 years, p=0.005) and had a higher APACHE-2 score than survivors (median, 24 vs. 14, p<0.001). APACHE-2 score ≥19 predicted mortality with 82% sensitivity and 80% specificity in patients with systemic rheumatic diseases.

Conclusions: ICU mortality was higher in patients with systemic rheumatic diseases. APACHE-2 score is a prognostic factor for ICU mortality in patients with systemic rheumatic diseases.

Keywords: APACHE II; intensive care units; mortality; rheumatic diseases

Öz

Amaç: Sistemik romatolojik hastalıklar, birçok organı etkileyebilen ve sıklıkla hastalığın şiddeti veya komplikasyonları nedeni ile yoğun bakım yatışı gereken bir grup hastalıktır. Bu çalışmada, medikal yoğun bakım ünitesinde (YBÜ) takip edilen sistemik romatolojik hastalık tanılı hastaların klinik özellikleri ve mortalite ile ilişkili faktörlerin değerlendirilmesini amaçladık.

Yöntemler: Bu retrospektif çalışma 1 Ocak 2018 ve 31 Aralık 2022 tarihleri arasında medikal YBÜ' de yapılmıştır. On sekiz yaş ve üzerinde bilinen veya yeni tanı almış sistemik romatolojik hastalığı olan ve YBÜ'de 48 saatten daha uzun süre takip edilen hastalar çalışmaya dahil edildi. Hastaların YBÜ'ye yatış nedenleri, klinik özellikleri ve mortalite ile ilişkili faktörleri değerlendirildi.

Bulgular: Çalışmaya dahil edilen 76 hastanın ortalama yaşı 60.8±15.0 yıldı ve en sık sistemik romatolojik hastalık romatoid artrit (%39) olarak tespit edildi. Yoğun bakıma en sık kabul edilme nedeni akut solunum yetmezliği (%64) ve septik şoktu (%16). Toplam 41 (%54) hasta YBÜ takipleri esnasında vefat etti. Vefat eden hastalar yaşayan hastalar ile karşılaştırıldığında daha ileri yaşta (ortalama yaş, 66.1 vs. 54.8 yıl, p=0.005) ve daha yüksek APACHE-2 skoruna (ortanca, 24 vs. 14, p<0.001) sahipti. APACHE-2 skorunun 19 ve üzeri olmasının %82 sensitivite ve %80 spesifite ile sistemik romatolojik hastalığı olanlarda mortaliteyi gösterdiği tespit edildi.

Sonuç: Sistemik romatolojik hastalığı olan hastalarda yoğun bakım mortalitesi yüksektir. APACHE-2 skoru YBÜ' de takip edilen sistemik romatolojik hastalığı olanlarda prognostik bir göstergedir.

Anahtar Sözcükler: APACHE II; ölüm oranı; romatizmal hastalıklar; yoğun bakım üniteleri

Received/*Geliş* : 01.03.2024
Accepted/*Kabul*: 16.09.2024

DOI: 10.21673/anadoluklin.1446032

Corresponding author/*Yazışma yazarı*

Tuba Demirci Yıldırım

Dokuz Eylül Üniversitesi, Tıp Fakültesi, Romatoloji Bilim Dalı, İzmir, Türkiye.
E-mail: tubademirci87@gmail.com

ORCID

Tuba D. Yıldırım: 0000-0003-3186-0591
Süleyman Yıldırım: 0000-0001-9856-3431
Cenk Kıraklı: 0000-0001-6013-7330

INTRODUCTION

Systemic rheumatic diseases are a group of heterogeneous diseases that affect joints, soft tissues, and organs due to chronic inflammation. The severity of these diseases varies from mild symptoms to severe, threatening organ failure and usually requires immunosuppressive treatments. Previous studies have reported an increased risk of hospitalization due to the disease severity or complications of the immunosuppressive treatments (1,2).

Among systemic rheumatic diseases, systemic lupus erythematosus (SLE), systemic vasculitis, and rheumatoid arthritis (RA) are most prevalent in the ICU (3–5) including morbidity and mortality, were assessed in relation to the underlying diseases, treatments and complications. Results Overall, 48 patients with rheumatoid arthritis, five patients with spondyloarthritis, 14 patients with vasculitis, 30 patients with connective tissue diseases and 11 patients suffering from other rheumatologic conditions were admitted to the intensive care unit (ICU. In previous studies, respiratory failure was reported as the most common cause of ICU admission (4,6)59 years [interquartile range, 42-70 years]. Infections and exacerbations of lung involvement from systemic rheumatic diseases were the leading reasons for respiratory failure. Septic shock and acute kidney failure were reported as other frequent reasons for ICU admission in the rheumatologic population (4,5,7)carried out at a medical ICU in a military referral hospital. All adult ICU admissions with a known rheumatologic diagnosis were evaluated during 28 consecutive months. There were 48 ICU admissions available for review in 36 patients (1.33 ICU admissions/patient.

The rate of ICU mortality in rheumatologic population varied a wide range from 16% to 55% in previous studies (3,5,8,9)most importantly, long-term outcomes are scarce. Research Question: The aim of this study was to assess short and long-term outcome of patients with SRD who were admitted to the ICU. Study Design and Methods: All records of patients with SRD who were admitted to ICU between 2006 and 2016 were reviewed. In-hospital and one-year mortality rates were assessed, and predictive factors of death were identified. Results: A total of 525 patients with SRD were included. Causes of admission were most frequently shock (40.8%. In previous studies, advanced age, higher APACHE-2 scores, and receiving invasive mechanical ventilation (IMV) were reported as prognostic factors for mortality (4,5,8)47 females. Patients who were admitted to ICU for infections had a higher mortality rate than patients who were admitted to ICU for non-infectious reasons (4,10,11)including 23 patients who died in the ICU. Multivariable logistic regression showed that poor prior health status (Berdit's classification.

Few studies have examined the prognosis and mortality-related factors of patients with systemic rheumatic diseases who were followed up in the ICU. This study aimed to evaluate the demographic and clinical characteristics of patients with rheumatic diseases followed in medical ICU and to determine the factors associated with mortality in these patients.

MATERIAL AND METHODS

This retrospective cohort study was conducted at the University of Health Sciences Turkey, İzmir School of Medicine, Dr. Suat Seren Chest Disease and Surgery Training and Research Hospital, Intensive Care Unit, between January 1, 2018, and December 31, 2022. İzmir is the third-biggest city in Turkey and is in the western region of Turkey. Our unit is a respiratory ICU consisting of 23 beds and 600–700 adult admissions per year.

During the study period, patients aged 18 years and older with known or newly diagnosed systemic rheumatic diseases who were followed up in the ICU for more than 48 hours were included in the study. Patients with systemic rheumatic diseases who stayed in the ICU for less than 48 hours, pregnant patients, and patients without systemic rheumatic diseases (osteoarthritis, etc) were excluded from the final analysis.

The definition of newly diagnosed rheumatic diseases was made by a rheumatologist, and patients with known systemic rheumatic diseases were based on previous diagnoses by a rheumatologist. Demographic data, type of rheumatological treatment, clinical features, the reasons for ICU admission, APACHE-2 scores, ICU treatments, the need for IMV, renal replacement therapy (RRT), and therapeutic plasma exchange were obtained from hospital medical records. Primary outcome of the study was ICU mortality.

This study was approved by University of Health Sciences Turkey, Dr. Suat Seren Chest Disease and Thoracic Surgery Teaching and Research Hospital, Clinical Research Ethics Committee (Date: 20.09.2023, decision no: 2023/54-52).

Statistical Analysis

All statistical analyses were performed using SPSS 26.0 (Statistical Package for the Social Sciences. IBM Corp. Armonk, NY).

Patients admitted to ICU due to infectious reasons, and non-infectious reasons were compared for ICU mortality. Pneumonia, septic shock, or tuberculosis were defined as infectious reasons for ICU admission. Other reasons for ICU admission were defined as non-infectious reasons such as flares of rheumatic diseases, pulmonary thromboembolism, and acute kidney injury. To evaluate the effect of rheumatological treatment on intensive care unit mortality, patients who received biological disease modifying anti-rheumatic drugs (bDMARDs) were compared with those who did not. Comparisons were made with Chi-Square test for categorical data and with independent sample t-test or Mann-Whitney U test for continuous data. We also performed a receiving operating characteristics (ROC) analysis for the discriminative power of APACHE-2 for mortality. The post hoc power analysis of the study was tested using the G Power program based on the mean differences between the groups (31 vs. 45 patients). The analysis was single-ended. With an effect size of 0.6 and a margin of error of 0.05, a total sample of 76 patients reached a power of 0.81. The results suggested that the sample was of sufficient size The cut-off value was determined according to the maximum Youden index. A p-value <0.05 was accepted as statistically significant.

RESULTS

Seventy-six patients were included in the final analysis; 40 (52%) patients were female, and the mean age was 60,8±15.0 years. Rheumatoid arthritis (39%), granulomatosis with polyangiitis (14%), and spondyloarthropathies (12%) were the most common rheumatic diseases in patients who were followed up in the ICU, and the median duration of rheumatic disease was 11 years. Hypertension (39%) and diabetes mellitus (18%) are the most common comorbid diseases other than rheumatic diseases (Table 1). Rheumatic diseases were newly diagnosed in ten patients (13%) during their ICU stay.

Most patients were admitted to ICU due to acute respiratory failure (64%). Septic shock (16%) and acute kidney injury (12%) were other common reasons for ICU admission. Pneumonia and exacerbations of lung involvement of rheumatic diseases were the main causes of acute respiratory failure. Sixty-one patients (80%) were followed up under invasive mechanical ventilation (IMV) during their IUC stay. One in four patients needed renal replacement treatment (RRT), and nine (12%) patients required therapeutic plasma exchange (Table 1).

Forty-one (54%) patients died during their ICU stay. Non-survivor patients were older (mean age, 66.1 vs. 54.8 years, p=0.005) and had a higher APACHE-2 score than survivors (median, 24 vs. 14, p<0.001). Need for IMV (67.2% vs. 32.8%, p<0.001) and RRT (78.9% vs. 21.1%, p=0.009) were found to be associated with ICU mortality. Patients who were admitted to the ICU due to infectious reasons had a higher mortality rate than patients who were admitted to the ICU due to non-infectious reasons, but the difference was statistically insignificant (59% vs. 46%, p=0.604). The mortality rates were similar in patients who received bDMARDs and did not receive them (52% vs. 54%, p=0.378) (Table 2). ROC analysis showed that APACHE-2 score had good discriminative power for ICU mortality in patients with systemic rheumatic diseases (AUC: 0.91, 95% CI: 0.84 – 0.99, p<0.001) (Figure 1). The cut-off value of APACE-2 score for ICU mortality was 19, with 82% sensitivity and 80% specificity.

DISCUSSION AND CONCLUSION

The main findings of our study were that RA was the most frequent systemic rheumatic disease in our ICU, followed by granulomatosis with polyangiitis and spondyloarthropathies. Most patients with systemic rheumatic diseases were admitted to ICU due to respiratory failure. The ICU mortality rate was 54%; advanced age, a higher APACHE-2 score, and the need for IMV or RRT were found to be associated with mortality.

Table 1. Demographic and clinical features of patients

	Patients (n = 76)
Age, mean±SD, years	60,8±15.0
Gender, Female, n (%)	40 (52)
BMI, mean±SD, kg/m^2	26,4±5,1
Rheumatic Diseases, n (%)	
Rheumatoid Arthritis	30 (39)
Granulomatosis with Polyangiitis	11 (15)
Spondyloarthropathies	9 (12)
Ankylosing Spondylitis	6 (8)
Psoriatic Arthritis	2 (3)
Enteropathic Arthritis	1 (1)
Sarcoidosis	9 (12)
Systemic Lupus Erythematosus	6 (8)
Familial Mediterranean fever	4 (5)
Behçet's Disease	4 (5)
Dermatomyositis	2 (3)
Scleroderma	1 (1)
Duration of Rheumatic Diseases, median (IQR), years	11 (4 – 25)
Rheumatological Treatment, n (%)	
Only cDMARDs	32 (42)
cDMARDs plus Steroids	8 (11)
Only bDMARDs	17 (22)
bDMARDs plus cDMARDs	4 (7)
Only Steroids	5 (17)
Comorbid Diseases, n (%)	
Hypertension	30 (39)
Diabetes Mellitus	14 (18)
Chronic Obstructive Pulmonary Disease	11 (14)
Coronary Artery Disease	9 (12)
Congestive Heart Failure	7 (9)
Malignancy	3 (4)
Cause of ICU admission, n (%)	
Acute Respiratory Failure	55 (72)
Pneumonia	30 (39)
Flare of Lung Involvement	19 (25)
Pulmonary Thromboembolism	4 (5)
Tuberculosis	2 (3)
Septic Shock	12 (16)
Acute Kidney Injury	9 (12)
APACHE-2 Score, median (IQR),	19 (15 – 24)
Invasive Mechanical Ventilation, n (%)	61 (80)
Renal Replacement Therapy, n (%)	19 (25)
Therapeutic Plasma Exchange, n (%)	9 (12)
Mortality, n (%)	41 (54)
Length of Stay in ICU, median (IQR), days	9 (6 – 19)

APACHE: Acute physiology and chronic health evaluation, BMI: Body mass index, DMARDs: Disease modifying anti-rheumatic drugs, ICU: Intensive care unit, IQR: Interquartile range, SD: Standard deviation

Data were shown as mean±SD, median (IQR) or n (%), ±: Plus-minus, SD: Standard deviation, n: Number, %: Percentage

SLE was reported as the most common systemic rheumatic disease in previous studies. Arjmand et al. reported that 50 of 91 (54.9%) ICU patients with systemic rheumatic diseases had SLE (4)life-threatening organ involvement, or complication of treatment. The objective of this study is to determine the causes, outcome, and prognostic factors of patients with rheumatologic diseases admitted in teaching medical ICUs in

Table 2. Comparison of survivor and non-survivor patients

	Survivors (n=35)	Non-Survivors (n=41)	*p*
Age, mean±SD, years	54.8±14.1	66.1±13.9	0.005
Duration of rheumatic diseases, median (IQR), years	7 (3 – 15)	8 (4 – 19)	0.321
Rheumatological treatment, bDMARDs, n (%)	10 (47.6)	11 (52.4)	0.378
ICU admission due to infection, n (%)	18 (40.9)	26 (59.1)	0.604
Invasive mechanical ventilation, n (%)	20 (32.8)	41 (67.2)	<0.001
Renal replacement therapy, n (%)	4 (21.1)	15 (78.9)	0.009
Theurapeutic plasma exchange, n (%)	5 (55.5)	4 (44.5)	0.806
Duration of rheumatic diseases, median (IQR), years	7 (3 – 15)	8 (4 – 19)	0.321
APACHE-2	14 (10 – 17)	24 (20 – 29)	<0.001
Length of stay in ICU, median (IQR), days	9 (6 – 18)	9 (5 – 22)	0.846

APACHE: Acute physiology and chronic health evaluation, bDMARDs: Biologic disease modifying anti-rheumatic drugs, ICU: Intensive care unit, IQR: Interquartile range, SD: Standard deviation

Data were shown as mean±SD, median (IQR) or n (%), n: Number, %: Percentage

southern Iran. Methods: A retrospective case review of all patients with rheumatologic diseases admitted in the academic medical ICUs in two referral hospitals in southern Iran, from March 2015 to January 2020. Patients' data were documented from their hospital records and the cause of admission, in-hospital outcome, and prognostic factors was evaluated. Results: Ninety-one patients were included, of which 71.4% were female. Systemic lupus erythematosus (54.9%. Cavallasca and colleagues reported that 38% of ICU patients with systemic rheumatic diseases had SLE (5)most importantly, long-term outcomes are scarce. Research Question: The aim of this study was to assess short and long-term outcome of patients with SRD who were admitted to the ICU. Study Design and Methods: All records of patients with SRD who were admitted to ICU between 2006 and 2016 were reviewed. In-hospital and one-year mortality rates were assessed, and predictive factors of death were identified. Results: A total of 525 patients with SRD were included. Causes of admission were most frequently shock (40.8%. In our study, RA was the most common systemic rheumatic disease. Although the prevalence of rheumatic diseases showed geographical differences, RA is one of the most frequent systemic rheumatic diseases. Çakır et al. reported that RA had a higher prevalence rate than other systemic rheumatic diseases in western Turkey (12). While RA predominantly affects the joints, extra-articular involvement is not uncommon; the lungs are one of the most affected extra-articular organs (13,14)in Olmsted County, Minnesota, USA. Methods. Data on incident ExRA were abstracted from medical records of patients with RA - Olmsted County residents who first met the 1987 American College of Rheumatology criteria for RA between January 1, 1995, and December 31, 2007. Patients were followed until death, migration from Olmsted County, or December 31, 2008. ExRA were classified using the predefined criteria and compared to the corresponding 1985-1994 inception RA cohort (n = 147. In our study, respiratory failure was the main reason for ICU admission. The fact that rheumatoid arthritis is both common and frequently affects the lungs were considered to be the main reason for the most common systemic rheumatic diseases in our cohort. RA was also reported as one of the most frequent systemic rheumatic diseases in the ICU. Brünnler et al. reported that 108 patients with rheumatic diseases were followed up in ICU and 48 (44%) of them had RA (3)including morbidity and mortality, were assessed in relation to the underlying diseases, treatments and complications. Results Overall, 48 patients with rheumatoid arthritis, five patients with spondyloarthritis, 14 patients with vasculitis, 30 patients with connective tissue diseases and 11 patients suffering from other rheumatologic conditions were admitted to the intensive care unit (ICU. It is common for patients to receive their first diagnosis of systemic rheumatic diseases during ICU admission. The diagnosis of systemic rheumatic diseases was made during the ICU stay in 14% of patients in Larcher's study (6)59 years [interquartile range, 42-70 years]. Arjmand et al. reported that 20%

of patients were new cases of systemic rheumatic diseases (4)life-threatening organ involvement, or complication of treatment. The objective of this study is to determine the causes, outcome, and prognostic factors of patients with rheumatologic diseases admitted in teaching medical ICUs in southern Iran. Methods: A retrospective case review of all patients with rheumatologic diseases admitted in the academic medical ICUs in two referral hospitals in southern Iran, from March 2015 to January 2020. Patients' data were documented from their hospital records and the cause of admission, in-hospital outcome, and prognostic factors was evaluated. Results: Ninety-one patients were included, of which 71.4% were female. Systemic lupus erythematosus (54.9%. In our study, ten cases (13%) were diagnosed with systemic rheumatic diseases during their ICU stay, and all of them had granulomatosis and polyangiitis. Systemic vasculitis was more likely to be newly diagnosed in the ICU due to severe specific organ involvement and the need for organ support therapy (6)59 years [interquartile range, 42-70 years].

Respiratory failure was found to be the main reason for ICU admission in our study. Pneumonia and acute exacerbations of lung involvement were the most common reasons for the development of respiratory failure in our patients. In previous studies, patients with systemic rheumatic diseases were mostly admitted to ICU due to infectious reasons. Arjmand et al. reported that the majority of patients with systemic rheumatic diseases need ICU admission due to infectious reasons (4)life-threatening organ involvement, or complication of treatment. The objective of this study is to determine the causes, outcome, and prognostic factors of patients with rheumatologic diseases admitted in teaching medical ICUs in southern Iran. Methods: A retrospective case review of all patients with rheumatologic diseases admitted in the academic medical ICUs in two referral hospitals in southern Iran, from March 2015 to January 2020. Patients' data were documented from their hospital records and the cause of admission, in-hospital outcome, and prognostic factors was evaluated. Results: Ninety-one patients were included, of which 71.4% were female. Systemic lupus erythematosus (54.9%. Infections were also reported as one of the most common reasons for ICU admission in a multicenter study conducted by Larcher and

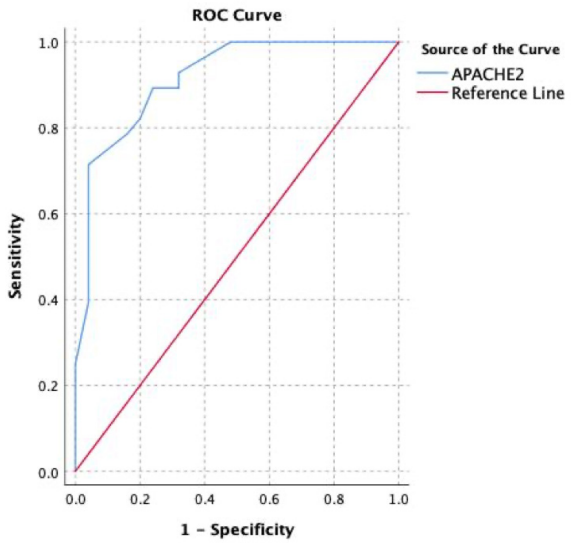

Figure 1. The Receiver operating characteristics analysis for intensive care unit mortality

colleagues (5)most importantly, long-term outcomes are scarce. Research Question: The aim of this study was to assess short and long-term outcome of patients with SRD who were admitted to the ICU. Study Design and Methods: All records of patients with SRD who were admitted to ICU between 2006 and 2016 were reviewed. In-hospital and one-year mortality rates were assessed, and predictive factors of death were identified. Results: A total of 525 patients with SRD were included. Causes of admission were most frequently shock (40.8%. In our study, more than half of the patients were admitted to ICU due to infectious complications such as acute respiratory failure due to pneumonia or septic shock. The risk of infection is increased in patients with rheumatic diseases because of an alternation of immunoregulation, comorbid diseases, or the use of immune suppressive treatments (15). Lungs were the main infection site in systemic rheumatic diseases such as RA and SLE (16,17)we performed a nested case-control study at the University of Toronto Lupus Clinic, with prospective follow-up according to a standard protocol since 1970. Cases were SLE patients seen between January 1987 and January 1992 who had documented infections and controls were patients without infection from the same cohort matched for age, gender and time of visit. The type, site and outcome of infection were recorded for each case. A conditional logistic regression analysis was

performed to compare factors associated with infection in cases and their controls. Ninety-three patients had 148 infection episodes; the majority were bacterial, but viral, fungal and protozoan organisms were also identified (multiple organisms in seven.

The ICU mortality of patients with rheumatic diseases varied widely in previous studies. The ICU mortality was reported at 16% by Brünnler et al. Larcher and colleagues reported that ICU mortality was 23.8%, and Cavallasca et al. reported 55% (3,5,9)including morbidity and mortality, were assessed in relation to the underlying diseases, treatments and complications. Results Overall, 48 patients with rheumatoid arthritis, five patients with spondyloarthritis, 14 patients with vasculitis, 30 patients with connective tissue diseases and 11 patients suffering from other rheumatologic conditions were admitted to the intensive care unit (ICU. We found the rate of ICU mortality was 54% in our study, slightly higher than that of the previous cohorts. Several factors were found to be associated with mortality in patients with systemic rheumatic diseases. A higher APACHE-2 score was one of the most important risk factors for ICU mortality in patients with systemic rheumatic diseases. The median APACHE-2 score was 12 in Brünnler's study, indicating that ICU mortality was lower (3)including morbidity and mortality, were assessed in relation to the underlying diseases, treatments and complications. Results Overall, 48 patients with rheumatoid arthritis, five patients with spondyloarthritis, 14 patients with vasculitis, 30 patients with connective tissue diseases and 11 patients suffering from other rheumatologic conditions were admitted to the intensive care unit (ICU. Aydın et al. reported that the mean APACHE-2 score was 24.7 and ICU mortality was 61% (18). The median APACHE score in our study was 19, which was higher than other studies and was thought to be the main reason for high mortality. APACHE-2 score had good discriminative power for mortality. Arjmand et al. reported that patients with an APACHE-2 score higher than 9 had a poor prognosis in ICU and the mortality rate with an APACHE-2 score above 9 was 96% (4)life-threatening organ involvement, or complication of treatment. The objective of this study is to determine the causes, outcome, and prognostic factors of patients with rheumatologic diseases admitted in teaching medical ICUs in southern Iran. Methods: A retrospective case review of all patients with rheumatologic diseases admitted in the academic medical ICUs in two referral hospitals in southern Iran, from March 2015 to January 2020. Patients' data were documented from their hospital records and the cause of admission, in-hospital outcome, and prognostic factors was evaluated. Results: Ninety-one patients were included, of which 71.4% were female. Systemic lupus erythematosus (54.9%. In our study, the cut-off value of APACHE-2 score for mortality was 19, with 82% sensitivity and 80% specificity. Need for IMV was another risk factor for ICU mortality. In previous studies, higher ICU mortality rates were reported in patients who were followed up with IMV (3,4)including morbidity and mortality, were assessed in relation to the underlying diseases, treatments and complications. Results Overall, 48 patients with rheumatoid arthritis, five patients with spondyloarthritis, 14 patients with vasculitis, 30 patients with connective tissue diseases and 11 patients suffering from other rheumatologic conditions were admitted to the intensive care unit (ICU. We found that the need for IMV was associated with ICU mortality; two of three patients who were followed up under IMV died during their ICU stay. In our study, most patients were followed up in the ICU due to respiratory failure, and the majority of patients (80%) needed IMV support, which was thought to be another reason for high mortality rate in our cohort. In previous studies, the mortality rate was reported to be higher in patients who were admitted to ICU due to infections (4,8)47 females. We found that patients who were admitted to the ICU for infectious reasons had a higher mortality rate than patients who were admitted for non-infectious reasons, but the difference was statistically insignificant. In our study, patients who received bDMARDs and patients who did not receive them had similar mortality rates. The effect of rheumatic treatment on ICU mortality is controversial. Godeu et al. reported that corticosteroid use was associated with poor prognosis; however, the use of corticosteroids or other immunosuppressive agents was not found to be associated with mortality by Moreels and colleagues (10,19).

Our study has several limitations. The results of our study cannot be generalized to all rheumatological populations because it is a single-center study. We assessed a limited number of parameters because our

study was retrospective. Most patients were admitted to the ICU for respiratory system-related complications such as respiratory failure because our center is specific to pulmonary intensive care. The severity of systemic rheumatic diseases may affect ICU outcomes. However, the severity of rheumatic diseases was unknown because the study was retrospective. Our study focused on the short-term outcomes of ICU patients with systemic rheumatic diseases; the long-term outcomes of these patients remain unclear.

In conclusion, patients with systemic rheumatological diseases have higher ICU mortality rates, and some of these patients may be diagnosed for the first time in the ICU. The APACHE-2 score may be useful for predicting mortality in patients with systemic rheumatologic diseases.

Conflict-of-interest and financial disclosure

The authors declare that they have no conflict of interest to disclose. The authors also declare that they did not receive any financial support for the study.

REFERENCES

1. Ferucci ED, Holck P. Hospitalizations associated with rheumatic disease in Alaska, 2015-2018. ACR Open Rheumatol. 2022;4(6):520.
2. Carrara G, Bortoluzzi A, Sakellariou G, et al. Risk of hospitalisation for serious bacterial infections in patients with rheumatoid arthritis treated with biologics. Analysis from the RECORD linkage on rheumatic disease study of the Italian Society for Rheumatology. Clin Exp Rheumatol. 2019;37(1):60-6.
3. Brünnler T, Susewind M, Hoffmann U, Rockmann F, Ehrenstein B, Fleck M. Outcomes and prognostic factors in patients with rheumatologic diseases admitted to the ICU. Intern Med. 2015;54(16):1981-7.
4. Arjmand M, Shahriarirad R, Shenavandeh S, Fallahi MJ. Determination of the main causes, outcome, and prognostic factors of patients with rheumatologic diseases admitted to the medical intensive care unit in Southern Iran. Clin Rheumatol. 2022;41(12):3859-68.
5. Larcher R, Pineton de Chambrun M, Garnier F, et al. One-year outcome of critically ill patients with systemic rheumatic disease: a multicenter cohort study. Chest. 2020;158(3):1017-26.
6. Dumas G, Géri G, Montlahuc C, et al. Outcomes in critically ill patients with systemic rheumatic disease: a multicenter study. Chest. 2015;148(4):927-35.
7. Kollef MH, Enzenauer RJ. Predicting outcome from intensive care for patients with rheumatologic diseases. J Rheumatol. 1992;19(8):1260-62.
8. Fujiwara T, Tokuda K, Momii K, et al. Prognostic factors for the short-term mortality of patients with rheumatoid arthritis admitted to intensive care units. BMC Rheumatol. 2020;4(1):1-11.
9. Cavallasca JA, Del Rosario Maliandi M, Sarquis S, et al. Outcome of patients with systemic rheumatic diseases admitted to a medical intensive care unit. J Clin Rheumatol. 2010;16(8):400-2.
10. Moreels M, Mélot C, Leeman M. Prognosis of patients with systemic rheumatic diseases admitted to the intensive care unit. Intensive Care Med. 2005;31(4):591-3.
11. Cruz BA, Ramanoelina J, Mahr A, et al. Prognosis and outcome of 26 patients with systemic necrotizing vasculitis admitted to the intensive care unit. Rheumatology (Oxford). 2003;42(10):1183-8.
12. Çakir N, Pamuk ÖN, Dervis E, et al. The prevalences of some rheumatic diseases in western Turkey: Havsa study. Rheumatol Int. 2012;32(4):895-908.
13. Myasoedova E, Crowson CS, Turesson C, Gabriel SE, Matteson EL. Incidence of extraarticular rheumatoid arthritis in Olmsted County, Minnesota, in 1995-2007 versus 1985-1994: a population-based study. J Rheumatol. 2011;38(6):983-9.
14. Bonfiglioli KR, de Medeiros Ribeiro AC, Carnieletto AP, et al. Extra-articular manifestations of rheumatoid arthritis remain a major challenge: data from a large, multi-centric cohort. Adv Rheumatol. 2023;63(1):1-9.
15. Cunnane G, Doran M, Bresnihan B. Infections and biological therapy in rheumatoid arthritis. Best Pract Res Clin Rheumatol. 2003;17(2):345-63.
16. Gladman DD, Hussain F, Iban D, Urowitz MB. The nature and outcome of infection in systemic lupus erythematosus. Lupus. 2002;11(4):234-9.
17. Listing J, Gerhold K, Zink A. The risk of infections associated with rheumatoid arthritis, with its comorbidity and treatment. Rheumatology (Oxford). 2013;52(1):53-61.
18. Aydin K, Türk İ. The Diagnostic profile and clinical course of patients with rheumatic diseases in the medical intensive care unit. Turk J Med Sci. 2023;53(5):1084-93.
19. Godeau B, Mortier E, Roy PM, et al. Short and longterm outcomes for patients with systemic rheumatic diseases admitted to intensive care units: a prognostic study of 181 patients. J Rheumatol. 1997;24(7):1317-23.