

Original Article

An example from non-traumatic emergency patient group in a post-conflict low-income region:
Dialysis patients applying to the emergency department in northwest Syria

Çatışma sonrası düşük gelirli bir bölgede travmatik olmayan acil hasta grubundan bir örnek: Kuzeybatı Suriye'de acil servise başvuran diyaliz hastaları

Bahadır Karaca¹, Murat Tepe², Hakan Güner³, Burak Çelik⁴, Mustafa Çetin⁵

¹Department of Emergency, Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital, Istanbul, Türkiye

²Department of Emergency, Kilis Prof. Dr. Alaeddin Yavaşca State Hospital, Kilis, Türkiye

³Department of Emergency, Midyat State Hospital, Mardin, Türkiye

⁴Department of Emergency, Kırşehir Training and Research Hospital, Kırşehir, Turkey

⁵Department of Internal Medicine, Hitit University Erol Olcok Training and Research Hospital, Corum, Türkiye

Corresponding author:

Burak Çelik

Address:

Kırşehir Training And Research
Hospital, Kervansaray, 2019. Sk.
No: 1, Özbağ/Kırşehir
Merkez/Kırşehir/TURKİYE

E-mail: burakcelik57@gmail.com

Received: 19.10.2022

Accepted: 01.11.2022

Cite as: KARACA.B et al. An
example from non-traumatic
emergency patient group in a post-
conflict low-income region: Dialysis
patients applying to the emergency
department in northwest Syria
IJCMBBS 2023;3(1):19-24 doi.org/
10.5281/zenodo.7556471

Abstract

Background: In this study, we aimed to investigate the demographic characteristics, comorbidities and reasons for applying to emergency dialysis in Syrian hemodialysis patients who applied to the emergency department.

Material Method: This study was conducted at Azez Vatan and Marea Hospitals in northwestern Syria. This study included end-stage renal failure (ESRD) patients and underwent emergency hemodialysis as a result of emergency department visits between January 1, 2022, and March 31, 2022. Demographic data, vital signs, laboratory results, concomitant diseases, and indications for emergency dialysis were investigated retrospectively and analyzed statistically.

Results : In this study has been detected that the mean age of the participants was 58 years and 34 (59.6%) of the patients were male and 23 (40.4%) were female. The patients who received two dialysis sessions per week older the patients who received three dialysis sessions per week (p=0.030). The presence of hypertension was found to be significantly higher in patients who received three sessions per week (p=0.004). Emergency dialysis was performed in 26.3% of patients due to hypervolemia, in 14.1% due to hyperkalemia, in 29.8% due to uremic findings, and in 29.8% due to metabolic acidosis. When the laboratory parameters have been investigated only sodium values were found to be significantly higher in patients who received two sessions of hemodialysis (p=0.004).

Conclusion: It may suggest that further increasing the hemodialysis service in northwest Syria may contribute to reaching the peak benefit to decrease the emergency dialysis patients.

Keywords: emergency department, hemodialysis, post-conflict area, Syria

ÖZ

Amaç: Bu çalışmada acil servise başvuran Suriyeli hemodiyaliz hastalarının demografik özelliklerini, böbrek yetmezliği nedenlerini, komorbiditelerini ve acil diyalize başvurma nedenlerini araştırmayı amaçladık.

Materyal ve Metod: Bu çalışma kuzeybatı Suriye'deki Azez Vatan ve Marea Hastaneleri'nde yürütülmüştür. Bu çalışmaya 1 Ocak 2022 - 31 Mart 2022 tarihleri arasında acil servise başvuran ve acil hemodiyaliz uygulanan son dönem böbrek yetmezliği (ESRD) hastaları dahil edildi. Demografik veriler, vital bulgular, laboratuvar sonuçları, eşlik eden hastalıklar ve acil diyaliz endikasyonları retrospektif olarak incelendi ve istatistiksel analizleri yapıldı.

Bulgular: Bu çalışmada katılımcıların yaş ortalamasının 58 olduğu ve hastaların 34'ünün (%59,6) erkek, 23'ünün (%40,4) kadın olduğu saptandı. Haftada iki diyaliz seansı alan hastalar, haftada üç diyaliz seansı alan hastalardan daha yaşlıydı (p=0,030). Haftada üç seans alan hastalarda hipertansiyon varlığı anlamlı olarak yüksek bulundu (p=0,004). Hastaların %26,3'üne hipervolemi, %14,1'ine hiperkalemi, %29,8'ine üremik bulgular ve %29,8'ine metabolik asidoz nedeniyle acil diyaliz uygulandı. Laboratuvar parametreleri incelendiğinde iki seans hemodiyaliz alan hastalarda sadece sodyum değerleri anlamlı olarak yüksek bulundu (p=0,004).

Sonuç: Kuzeybatı Suriye'de hemodiyaliz hizmetinin daha da artırılması, acil diyaliz hastalarını azaltmaya katkı sağlayabilir.

Anahtar Kelimeler: Acil servis, çatışma sonrası bölge, hemodiyaliz, Suriye

Highlights

- The emergency dialysis patients from Northwest Syria who received two dialysis sessions per week were older than the patients who received three times.
- The emergency dialysis patients who received three sessions per week in northwest Syria have more hypertension comorbidity.
- Metabolic acidosis and uremic findings are more frequent indications for emergency dialysis than hypervolemia and hyperkalemia in a post-conflict area like Northwest Syria.
- The sodium values of the patients who received two sessions of dialysis in emergency dialysis patients were higher than those who received three sessions of hemodialysis.

Introduction

Chronic renal failure (CRF) has become a public health problem with increasing prevalence worldwide. During disease progression and treatment, quality of life is significantly affected, and treatment costs are gradually increasing (1). Renal replacement therapies (RRT) are used in patients with CRF. RRT methods include hemodialysis, peritoneal dialysis, and kidney transplantation (2). According to reports from the European Renal Association-European Dialysis and Transplant Association (ERAEDTA), 81,714 RRTs were initiated for CRF in 2018, representing an incidence rate of 129 per million population (3).

Although hospitalization rates for patients with end-stage renal failure (ESRF) have decreased in recent years, emergency department visits have increased. The reason for this may be the increase in the duration of observation in the emergency department. Renal failure patients are about eight times more likely to be admitted to the emergency department compared with the general population (4). Repeated visits of dialysis patients to the emergency department cause unnecessary healthcare costs and disrupt the planning of treatment services (5). According to a study conducted in the United States of America, spending on dialysis patients is approximately \$36 billion annually and accounts for 7.2% of all healthcare spending (6).

Treating ESRD patients requires trained healthcare workers, various medications, and advanced technology medical equipment. Wars make access to all these medical needs impossible or difficult (7). Therefore, an increase in the number of dialysis patients admitted to emergency departments is inevitable in countries where there is war or civil unrest and no regular health care. According to the United Nations Office for the Coordination of Humanitarian Affairs, the ongoing conflict in Yemen since March 2015 has had a serious negative impact on hospital dialysis centers. The number of dialysis sessions in hospitals has been significantly reduced to one session every two weeks, and the duration of sessions has been reduced from five to three hours (8).

In regions where civil unrest continues after the war, such as northern Syria, attempts are being made to address most of the problems of this patient group palliatively with emergency services. There are no studies in the literature on dialysis patients' emergency department visits in northern Syria after the civil war. Identifying these patient profiles could help reduce emergency department visits and the need for acute medical care. This could guide health services in similar regions. In this study, we aimed to investigate the demographic characteristics, comorbidities, and reasons for applying to emergency dialysis in Syrian hemodialysis patients who applied to the emergency department.

Materials and Methods

Study Design

This study was conducted at Azez Vatan Hospital and Marea Hospitals in northwestern Syria, where Turkey provides consultation services. This study included 57 ESRD patients who were routinely undergoing hemodialysis and underwent emergency hemodialysis as a result of emergency department visits between January 1, 2022, and March 31, 2022. The patients' data were retrospectively analyzed. Approval was also obtained from the administrations of the hospitals concerned and Ethics committee approval was obtained from the Hatay Mustafa Kemal University Non-Interventional Research Ethics Committee (Meeting date: 30.06.2022 and Decision number: 04).

Location of the study

There are hospitals in northern Syria where Turkey provides consultation services. Syrian doctors, nurses, other medical professionals, and support staff work in these hospitals. The population living in the region receives services from these hospitals. This study was conducted at Azez Vatan Hospital and Marea Hospital in Northern Syria.

Azez Vatan Hospital: Azez is a city south of Kilis, on the border with Turkey. It has about 300 thousand inhabitants and part of the population lives in tent cities. Azez Vatan Hospital is located in the west of the city

and has a capacity of 186 beds. It has specialized departments such as the general intensive care unit, pediatric intensive care unit, neonatal intensive care unit, and dialysis unit (9,10). It has 6 hemodialysis machines and regularly provides dialysis services for patients with end-stage renal failure (10).

Marea Hospital: The city of Marea is located in the south of Kilis province and currently has a population of approximately 50,000. Marea Hospital has a capacity of 75 beds and has specialized departments such as the general intensive care unit, neonatal intensive care unit, and dialysis unit. The dialysis department treats ESRD patients with 13 hemodialysis machines (11).

Selection of patients

Among routine hemodialysis patients admitted to the emergency department, patients aged 18 years and older who underwent emergency hemodialysis were included in the study. Patients with missing data and patients younger than 18 years were excluded from the study.

Obtaining the data

Demographic data, vital signs, laboratory results, concomitant diseases, and indications for emergency dialysis were obtained from previously prepared patient record forms.

Statistics

Statistical analyzes for the study were performed using Statistical Package for Social Sciences version 28.0 software for Windows (IBM SPSS Statistics for Windows, version 28.0. Armonk, NY: IBM Corp., USA). Normality assumptions for the quantitative variables were made using Kolmogorov-Smirnov and Shapiro-Wilk tests. Descriptive statistics of the variables are reported as mean \pm standard deviation, median (min-max), and n(%). The chi-square test, Fisher's exact test, Mann-Whitney U test, Kruskal-Wallis test, and independent t-test were used depending on the type of variables and whether the assumptions were met.

Results

A total of 57 subjects participated in the study. 34 (59.6%) of the patients were male and 23 (40.4%) were female. The mean age of the participants was 58 years, the youngest was 18 years old, and the oldest was 85 years old. The difference between the mean age of patients who received 2 dialysis sessions per week and the mean age of patients who received 3 dialysis sessions per week was statistically significant ($p=0.030$). The mean age of patients who received 2 sessions per week was higher (Table 1). Among male patients, 19 (55.9%) received 2 dialysis sessions per week and 15 (44.1%) received 3 dialysis sessions per week. Among female patients, 14 (60.4%) received 3 dialyses 9 and (39.1%) received 2 sessions per week. The association between the number of hemodialysis visits and gender was not statistically significant ($p=0.215$).

Table 1: Mean and median ages according to the number of weekly hemodialysis sessions

	Total	2 Sessions/Week (n=28)	3Sessions/Week (n=29)	p
Age	52.61 \pm 16.57 58 (18-85)	56.32 \pm 17.79 62 (18-85)	49.03 \pm 14.73 50 (24-75)	0.030*

*: Mann Whitney U test

When the comorbidities of the patients were analyzed, 64.9% had hypertension (HT), 45.6% ($n=26$) had diabetes mellitus (DM), and 3.5% had congestive heart failure (CHF). When patients who received 2 dialysis sessions per week were compared with patients who received 3 dialysis sessions per week in terms of comorbidity, the presence of HT was found to be significantly higher in patients who received 3 sessions per week ($p=0.004$). The relationship between the number of sessions and comorbidity is shown in Table 2.

Table 2: The relationship between the number of hemodialysis sessions and comorbidity

	Total	2 Sessions / Week	3 Sessions / Week	p
Diabetes Mellitus	Yes 26 %45,6)	15(%53.6)	11(%37.9)	0.236*
Hypertension	Yes 37(%64.9)	13(%46.4)	24(%82.8)	0.004*
Heart Failure	Yes 2(%3.5)	1(%3.6)	1(%3.4)	1.000#

*: Chi Square test, #: Fisher Exact Test

The association between emergency dialysis indications and the number of sessions was not statistically significant ($p=0.948$). The number of weekly dialysis sessions did not affect the indications for emergency hemodialysis. Emergency dialysis was performed in 29.8% due to uremic findings, in 29.8% due to metabolic acidosis, in 26.3% of patients due to hypervolemia, and in 14.1% due to hyperkalemia (Table 3).

Table 3: Distribution of indications for emergency hemodialysis

	Hypervolemia	Hyperkalemia	Hyperuremia	Met. Acidosis	p
Two Sessions /Week	%53.3 (n=8)	%50 (n=4)	%41.2 (n=7)	%52.9 (n=9)	0.948 [#]
Three Sessions /Week	%46.7 (n=7)	%50 (n=4)	%58.8 (n=10)	%47.1 (n=8)	
Total	%26.3 (n=15)	%14.1 (n=8)	%29.8 (n=17)	%29.8 (n=17)	

#: Fisher Exact Test

When various laboratory parameters of the patients were compared between patients who received 2 and 3 weekly hemodialysis sessions, only sodium (Na) values were found to be significantly higher in patients who received 2 sessions of hemodialysis ($p=0.004$). No statistically significant difference was found in terms of other parameters. When the hemoglobin values of the patients were examined, the values of both the group receiving 2 sessions (9.75 ± 1.45 g/dl) and the group receiving 3 sessions (9.98 ± 1.70 g/dl) were below the normal values, but there was no statistically significant difference between the two groups ($p=0.588$)(Table 4). When the causes of end-stage renal failure were analyzed, no statistically significant difference was found between men and women ($p=0.843$). In the analysis of mean age by etiology of renal failure, no significant difference was found between groups ($p=0.223$)

Table 4: The relationship between the laboratory parameters of the patients and the number of hemodialysis sessions

Parameters	2 Sessions / Week	3 Sessions / Week	p#
Hemoglobin (gr/dL)	9.75±1.45 10.20(5.9-11.6)	9.98±1.70 9.80(6.9-13.4)	0.588
Leukocyte (x10⁶/L)	7.13±2.68 6.75(3.60-13.20)	7.21±2.37 6.56(4.10-12.81)	0.684
Platelets (x10⁶/L)	200.50±58.47 191.50(99.0-322.0)	190.22±83.50 192.0(2.43-408.0)	0.594
Glucose (mg/dL)	132.33±76.61 102.0(55.0-431.5)	152.91±129.50 110.0(52.0-713.0)	0.719
Urea (mg/dL)	179.60±58.32 166.5(88.0-307.0)	161.35±45.38 148.0(83.0-261.0)	0.192
Creatinine (mg/dL)	7.36±2.39 7.34(2.92-12.80)	8.48±2.64 8.36(4.77-13.50)	0.098
Na (Sodium) (mmol/L)	139.46±3.45140.0(133.0-147.0)	136.13±4.72 137.0(122.0-143.0)	0.004
K (Potassium) (mmol/L)	4.90±0.83 4.73(3.66-6.70)	5.02±0.63 4.93(3.83-6.40)	0.541
Ca (Calcium) (mmol/L)	8.09±1.14 7.94(6.37-10.89)	8.27±0.89 8.38(5.99-9.80)	0.514
P (phosphor)(mmol/L)	5.11±1.78 5.67(1.13-7.37)	5.89±1.18 6.0(3.07-7.60)	0.056
Alanine aminotransferase (U/L)	17.85±11.52 15.2(7.0-57.0)	16.51±9.15 15.0(6.0-46.6)	0.604
Aspartate aminotransferase (U/L)	17.96±14.64 14.0(5.0-71.0)	17.79±11.47 14.80(7.0-53.7)	0.731

#: Fisher Exact Test

Discussion

In this study, emergency admissions of chronic kidney failure patients in a post-conflict region in northwest Syria were evaluated. HT was the most common comorbidity in these patients, while metabolic acidosis and uremic findings were found to be the most common emergency dialysis indications.

Since the routine use of hemodialysis treatment in the 1940s, a significant increase in life expectancy has been observed in ESRD patients (12). As the survival rate of ESRD patients has increased, so has the number of patients undergoing routine hemodialysis. With this increase, the number of hemodialysis centers has also increased, and guidelines for hemodialysis have been established and attempts have been made to facilitate patient follow-up through regular updates of the guidelines (13). A reputable technical infrastructure and the presence of trained personnel are essential for hemodialysis centers. Access to trained personnel and technical

infrastructure can be easily damaged during natural disasters and war. There is not much information in the literature on how ESRD patients are affected in war zones (14).

This study analyzed data from 57 routine hemodialysis patients aged 18 years and older who underwent emergency hemodialysis after being admitted to the emergency departments of the hospitals. Of the patients included in this study, 59.6% were male and 40.4% were female. In a study by Aktepe et al, who examined patients with hemodialysis indication in the emergency department, 37.9% of patients were female and 62.1% were male, which is parallel to this study (2). Similarly, in a study by Özpolat et al. that examined patients with emergency hemodialysis indications in the emergency department, 56.6% of patients were male and 43.4% were female. (15). Of the patients included in this study, 64.9% had HT, 45.6% had diabetes mellitus, and 3.5% had CHF. In a study by Gülle et al. that investigated the need for emergency hemodialysis in routine hemodialysis patients, 63.1% had HT, 47.1% of patients had DM, and 33% had CHF (16). In a study by Özpolat et al, 66.3% had HT, 47.6% of dialysis patients had DM, and 37.1% had cardiac disease (15). In a study by Kaplan et al., 35% of dialysis patients most commonly had HT, and secondly, 27% had DM (17). Similarly, HT and DM were the most common comorbidities in three studies.

Of the patients enrolled in this study, 28 (49.1%) received 2 hemodialysis sessions per week and 29 (50.9%) received 3 sessions per week. In a study conducted by Gürsu et al. evaluating Syrian refugees living in Turkey who received routine hemodialysis, the proportion of patients who received 3 sessions per week was 91.9%, which is different from this study (18). In a study conducted by Isreb et al. on Syrian refugee hemodialysis patients living in Jordan, the rate of patients receiving 3 sessions of hemodialysis per week was approximately 57%, which is similar to this study (19). When the indications for hemodialysis of the patients in this study were investigated, 29.8% of patients were admitted for emergency hemodialysis due to metabolic acidosis, 29.8% due to uremic findings, 26.3% due to hypervolemia, and 14.1% due to hyperkalemia symptoms. In the study by Gülle et al, the indications for emergency hemodialysis were 31.8% hypervolemia, 22.7% hyperkalemia, 21% uremic findings, and 19.2% metabolic acidosis, and their rates were not parallel with this study (16). When the indications for emergency hemodialysis in routine hemodialysis patients were examined in the study by Özpolat et al, hypervolemia ranked first at 53.1% and metabolic acidosis ranked last at 4.1% (15). This study differs from this study in terms of emergency hemodialysis indications. In addition, the indications for emergency hemodialysis were compared between patients who received 2 sessions per week and patients who received 3 sessions per week in this study, and no statistically significant result was found. When we looked at the literature, we could not find any relevant data. Various laboratory parameters of patients were compared between patients who received 2 and 3 dialysis sessions per week, and it was found that only sodium levels (Na⁺) were significantly higher in the group of patients who received 2 dialysis sessions. No relevant data could be found in the literature. No statistically significant difference was found in the other parameters. Hemoglobin level was 9.75 ± 1.45 gr/dl in the group receiving 2 sessions per week and 9.98 ± 1.70 gr/dl in the group receiving 3 sessions per week. There was no statistically significant difference between the two groups, and the values were lower than in healthy subjects. Anemia is commonly observed in patients with renal failure. The most important reason is erythropoietin deficiency. In addition, hemorrhage, hemolysis, chronic inflammation, and shortening of erythrocyte life span due to oxidative stress are other causes of anemia (20).

Conclusion

In a post-conflict region such as northwest Syria, patients with chronic renal failure present to the emergency department. It was observed that patients who applied to the emergency department twice a week had less hypertension and were older. Geriatric patients may be receiving dialysis in fewer numbers due to difficulties in accessing dialysis in post-conflict areas, and these patients with more comorbidities may have a shorter life expectancy. It may suggest that further increasing the hemodialysis service in northwest Syria may contribute to reaching the peak benefit.

Acknowledgments: *The authors would like to thank Prof. Dr. Özkan GORGULU (Kırşehir Ahi Evran University, Faculty of Medicine, Biostatistics and Medical Informatics Department) for his assistance in the statistical analysis of the study*

Ethical Approval: *Permission was obtained from Hatay Mustafa Kemal University Non-Interventional Research Ethics Committee (2022/30-6 Decision number:04).*

Author Contributions: *Concept: BK, MT, HG, BÇ, MÇ Literature Review: BK, MT, HG, BÇ, MÇ Design: BK, MT, HG, BÇ, MÇ. Data acquisition: BK, MT, BÇ, MÇ Analysis and interpretation: BK, MT, HG, BÇ, MÇ Writing manuscript: BK, MT, HG BÇ, MÇ Critical revision of manuscript: BK, MT, HG, BÇ, MÇ*

Conflict of Interest: *The authors have no conflicts of interest to declare.*

Financial Disclosure: *Authors declared no financial support.*

References

1. Foley RN, Wang C, Ishani A, et al. NHANES III: influence of race on GFR thresholds and detection of metabolic abnormalities. *Journal of the American Society of Nephrology*. 2007;18(9), 2575-82.
2. Aktepe M, Akdeniz YS, İpekci A, et al. Acil Serviste Hemodiyaliz Endikasyonu Konulan Hastaların Analizi. *Phoenix Medical Journal*. 2020;2(3), 145-51.
3. Kramer A, Boenink R, Stel VS, et al. The ERA-EDTA registry annual report 2018: a summary. *Clinical Kidney Journal*, 2021;14(1), 107-23.
4. Han G, Bohmart A, Shaaban H, et al. (2021). Emergency Department Utilization Among Maintenance Hemodialysis Patients: A Systematic Review. *Kidney medicine*.
5. Loran MJ, McErlean M, Eisele G, et al. The emergency department care of hemodialysis patients. *Clinical Nephrology*. 2002;57(6), 439-43.
6. Saran R, Robinson B, Abbott KC, et al. US Renal Data System 2019 Annual Data Report: epidemiology of kidney disease in the United States. *Am J Kidney Dis*. 2020;75(1 suppl 1):S1–S64.
7. Vanholder R, Gallego D, Sever MS. Wars and kidney patients: a statement by the European Kidney Health Alliance related to the Russian-Ukrainian conflict. *Journal of Nephrology*. 2022;1-4.
8. Official Website of Office for the Coordination of Humanitarian Affairs. ‘Yemen’s Dialysis patients fear for their lives amid medical shortages’. (Cited: 19 Jan 2017) Available from: <https://www.unocha.org/story/yemen%E2%80%99s-dialysis-patients-fear-their-lives-amid-medical-shortages>. (Date of access:18.11.2022)
9. Karaca B, Çelik B. (2022). Can 4C Score Predict Mortality due to COVID-19 Pneumonia in Syria? An Observational Study. *Southern Clinics of Istanbul Eurasia*, 33(3).
10. Kilis İl Sağlık Müdürlüğü Suriye Görev Gücü Başkanlığı [homepage on the Internet] Azez Vatan Hastanesi [updated 14 Apr 2021; cited 18 Nov 2022]. Available from: <https://kilissgg.saglik.gov.tr/TR,69179/azez-vatan-hastanesi.html#>
11. Kilis İl Sağlık Müdürlüğü Suriye Görev Gücü Başkanlığı [homepage on the Internet] Marea Hastanesi [updated 14 Apr 2021; cited 20 Nov 2022]. Available from: <https://kilissgg.saglik.gov.tr/TR-69176/marea-hastanesi.html#>
12. US Renal Data System. (2013). *USRDS 2013 annual data report: atlas of chronic kidney disease and end-stage renal disease in the United States*. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Vol. 2014.
13. Daugirdas JT, Depner TA, Inrig J, et al. KDOQI clinical practice guideline for hemodialysis adequacy: 2015 update. *American Journal of Kidney Diseases*. 2015;66(5), 884-930.
14. Sekkarie MA, Zanabli AR, Rifai AO, et al. The Syrian conflict: assessment of the ESRD system and response to hemodialysis needs during a humanitarian and medical crisis. *Kidney International*. 2015;87(2), 262-5.
15. Özpolat Ç, Altunbaş E. Retrospective Analysis of Patients with Emergency Hemodialysis Indication in the Emergency Department. *Anatolian Journal of Emergency Medicine*. 2022;5(3), 124-7.
16. Gülle S, Yıldırım M, Karakaş B, et al. Evaluation of Urgent Hemodialysis in Maintenance Hemodialysis Patients: A 2-Year Retrospective Single Center Study. *Turkish Nephrology, Dialysis and Transplantation Journal*, 2016;25(3), 289-95.
17. Kaplan NB., Arık N. (2022). Evaluation of polypharmacy and adherence to the phosphorus binding treatment in hemodialysis patients: Evaluation of polypharmacy and adherence in hemodialysis patients. *International Journal of Current Medical and Biological Sciences*, 2(3), 157-64.
18. Gursu M, Arici M, Ates K, et al. Hemodialysis experience of a large group of Syrian refugees in Turkey: all patients deserve effective treatment. *Kidney and Blood Pressure Research*. 2019;44(1), 43-51.
19. Isreb MA, Kaysi S, Rifai AO, et al. The effect of war on Syrian refugees with end-stage renal disease. *Kidney International Reports*. 2017;2(5), 960.
20. Aydın Z, Gürsu M, Uzun S, et al. (2012). Evaluation of the Relationship of Hepcidin Levels with Anemia and Inflammatory Markers in Patients on Peritoneal Dialysis: A Controlled Study. *Turkish Nephrology, Dialysis and Transplantation Journal*. 2012;21(1), 66-71.