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Original Article

Utility of Inferior Vena Cava and Internal Jugular Vein Ultrasonography for Evaluation of Treatment Efficiency in Patients with Acute Heart Failure

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Abstract

Aim: The aim of this study was to evaluate the usability of ultrasonographic assessment of inferior vena cava (IVC) diameter and internal jugular vein (IJV) ultrasonography for detection of treatment efficiency after acute decompensate heart failure (ADHF) treatment in patients presented to the emergency department with decompensate heart failure symptoms.

Materials and Methods: This prospective cohort study was conducted with the patients presented with the ADHF symptoms IJV inspiration-anteroposterior and area measures, M Mod inspiration-expiration, IVC inspiration-expiration and IJV-İVC collapse index values of the patients were measured before the treatment of heart failure.

Results: There was a statistically significant decrease values of IJV anterior posterior inspiratory diameter, IJV area inspiratory diameter, IJV M-Mod inspiratory, IJV M-Mod expiratory, IVC expiratory and inspiratory diameter measurements before and after treatment ($p<0.001$ for all values).There was a statistically significant positive correlation was seen for all measurement between before and after treatment ($p<0.001$ for all values).

Conclusion: We think that in patients with heart failure, ultrasonographic measurements of IVC and IJV can be used to evaluate the efficacy of the treatment.

Keywords: Internal jugular vein ultrasonography, acute heart failure, inferior vena cava

CITATION

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INTRODUCTION

Nowadays, in the emergency department, bedside ultrasonography (USG) has been an important part of emergency medicine training. Recently, the studies indicated that inferior vena cava (IVC) and internal jugular vein (IJV) USG can be used in assessment of volume status. In some studies measuring IVC and IJV diameters have shown that, volume losses can be detected efficiently whether early detection of changes in the other parameters (1,2). Also it is reported that, especially in patients with chronic renal failure and heart failure, IVC diameters can be used in the assessment of hypervolemia (3,4). The aim of this study was to evaluate the usability of ultrasonographic assessment of IVC diameters and IJV diameters for detection of treatment efficiency after acute decompensated heart failure (ADHF) treatment in patients presented to the emergency room with decompensated heart failure symptoms.

MATERIALS AND METHODS

Before starting the study, the ethics committee decision numbered 2015- B.10.4 was taken from the Ethics Committee of Keçiören Training and Research Hospital on 14/01/2015.

This cohort study was performed at the Training and Research Hospital Emergency Room between January 30th and June 30th 2015. The study protocol was approved by the local ethics committee before patient enrollment written informed consent was obtained from the patients or close relatives.

Patients' selection

Adult patients presented to the emergency room with ADHF symptoms and patients with history of heart failure were included the study. Patients excluded the study that who have central venous catheter or experienced central venous catheter placement, serum albumin <3.0 g/dl, chronic obstructive pulmonary disease, asthma, heart valve surgery, radiotherapy or neck surgery, hypotension at admission or patients who have IJV or IVC imaging limitations, comorbid diseases, cardiovascular interventions and drugs were noted. Patients who diagnosed hypertension or used antihypertension drugs noted as hypertension, which diagnosed diabetes mellitus or used antidiabetic drugs noted as diabetic, who have previous heart attack, coronary surgery or endovascular interventions noted as coronary artery disease. Detailed cardiopulmonary examination was performed to patients admitted to the emergency department with complaints of heart failure. After the vital signs, simultaneously, ultrasonographic measurements of IVC and IJV diameters were performed. After recording the admission values, heart failure treatment was administered. For treatment, furosemide (1mg/kg) was given to patients with normal arterial blood pressure, furosemide (1 mg/kg) + nitroglycerin (0.1 µ/kg/h) was given to patients with high arterial blood pressure. Hypotensive patients were excluded. At the2nd and 4thhours of treatment, diameter measurements were repeated. In the study, before and after treatment, inspiratory anterior-posterior IJV diameter and area measurements, inspiratory and expiratory IJV M-Mod measurements, inspiratory and expiratory IVC diameter measurements were obtained and the IJV-IVC collapsibility index was calculated.

Diameter measurements

Diameter measurements are performed by emergency medicine specialist and senior resident. both experienced in ultrasound. A portable ultrasound machine (Mindray DC-3 Shenzhen Mindray Bio-Medical Electronics Co. Ltd. China) was used for measurements. The measurement of IVC diameter, with the patient supine, was made from 5 cm below xyphoid and 3 cm under the diaphragm by 3.5 MHz convex probe. Linear transducer was placed on the neck using the external sign of sternocleidomastoideus (SCM) and IJV was depicted just below the sternal and the clavicular head of the bifurcation of the SCM. IJV imaging was performed in the longitudinal plane, measured on the M mode during end inspiration and end expiration. The IJV collapsibility index was calculated as (IJV expiration – IJV inspiration) / (IJV expiration) × 100. The IVC collapsibility index was calculated as (IVC expiration – IVC inspiration) / (IVC expiration) × 100. All scanning protocol was continuously monitored and the measurements were attempted in the same position.

Statistical analysis

The statistical software SPSS (version 17.0; SPSS Inc. Chicago. IL) was used for data analysis. The Kolmogorov-Smirnov test was used to evaluate whether the distribution of continuous variables were normal. Categorical data are presented as frequencies and percentages; normally distributed continuous data, as the mean± standard deviation (SD) with minimum and maximum values. After the treatment of heart failure, if there is a statistically significant change, variance analysis was used for parametric datas and Friedman test was used for non-parametric datas. For the median values, Sphericity Assumed and Greenhouse-Geisser tests were used for parametric datas, Wilcoxon Signed test was used for non-parametric data. To find out a correlation between clinically measurements, Spearman' rho correlation coefficien was calculated. A p values below 0.05 were considered statistically significant.

RESULTS

Of the 90 patients evaluated, 46 patients (28 men and 18 women) with ADHF were actually enrolled in the study. 44 patients were excluded the study. Twenty eight patients were men (60.86%); and the mean age of the patient group was 74.6±10.12 years. The most common comorbidity was hypertension (82.6%). Ejection fraction percentage of the patients was 45.67±11.47. Patient demographics and vital signs are presented in Table 1.

Before treatment, at the 2nd and the 4th hour of treatment, IJV anterior posterior inspiratory diameter, IJV area inspiratory diameter, IJV M-Mod inspiratory, IJV M-Mod expiratory measures, IVC expiratory diameter, IVC inspiratory diameter measures and calculated collapsibility index measurements are shown in Table 2.

There was a statistically significant decrease value of IJV anterior posterior inspiratory diameter, IJV area inspiratory diameter, IJV M-Mod inspiratory, IJV M-Mod expiratory, IVC expiratory and inspiratory diameter measurements before and after treatment ($p<0.001$ for all values), however there was no statistically significant difference in the values of IVC and IJV collapsibility index before and after treatment at second and forth hours (respectively $p=0.718$, $p=0.205$, $p=0.844$, $p=0.902$), (Table 3).

There was a statistically significant positive correlation was seen for all measurement between before and after treatment ($p<0.001$ for all values), (Table 4).

Table 1. Demographic characteristics and vital signs of patients

Variables	n=46
Age. years. (mean ± SD)	74.60±10.12
Sex. n (%) Men	28 (60.86%)
Comorbidity. n (%)	
Diabetes	19 (41.30%)
Hypertension	38 (82.60%)
Coronary artery disease	29 (63.04%)
Atrial fibrillation	20 (43.47%)
Cerebrovascular disease	5 (10.86%)
Use of diuretics. n (%)	38 (82.60%)
Ejection fraction. %	45.67±11.47
Treatment. n (%)	
Furosemide	30 (65.21%)
Furosemide+Nitroglycerine	16 (34.78%)
Urine output. (mlt) (mean ± SD)	
AT 2nd hour	1190 (50-2400)
AT 4th hour	891 (50-2500)
Vital signs (mean ± SD)	
SBP. mmHg	
BT	145.32±31.89
AT 2nd hour	137.13±26.71
AT 4th hour	132.56±23.34
DBP. mmHg	
BT	81.26±16.35
AT 2nd hour	75.39±15.14
AT 4th hour	75.00±14.32
Saturation	
BT	86.89±7.14
AT 2nd hour	90.73±4.78
AT 4th hour	91.43±4.11
Pulse. minute	
BT	93.58±19.24
AT 2nd hour	84.67±15.44
AT 4th hour	83.52±15.71

BT: Before treatment. AT: After treatment. SBP: Systolic blood pressure. DBP: Diastolic blood pressure

Table 2. Before and after treatment ultrasonographic measurements

	Hour	n	Min.	Max.	Mean±SD
IJV AP INS	BT	46	0.75	2.80	1.56±0.38
	AT 2nd hour	46	0.62	2.44	1.39±0.36
	AT4st hour	46	0.13	2.41	1.26±0.39
IJV ARE INS	BT	46	0.58	6.60	2.27±1.27
	AT 2nd hour	46	0.46	5.60	1.88±1.08
	AT4st hour	46	0.45	4.93	1.65±0.99
IJV M MOD INS	BT	46	0.72	7.90	1.50±1.03
	AT 2nd hour	46	0.43	6.20	1.30±0.82
	AT4st hour	46	0.33	5.60	1.17±0.76
IJV M MOD EXP	BT	46	0.91	10.80	1.85±1.42
	AT 2nd hour	46	0.53	9.20	1.62±1.22
	AT4st hour	46	0.52	7.60	1.46±1.02
IJV CI	BT	46	2.80	42.80	17.24±9.89
	AT 2nd hour	46	3.20	46.90	17.66±9.14
	AT4st hour	46	3.40	56.00	19.25±11.02
IVC EXP	BT	46	1.72	3.43	2.41±0.36
	AT 2nd hour	46	1.40	3.23	2.27±0.37
	AT4st hour	46	1.23	3.13	2.16±0.36
IVC INS	BT	46	1.40	3.31	2.18±0.34
	AT 2nd hour	46	1.07	2.93	2.06±0.37
	AT4st hour	46	0.99	2.90	1.97±0.39
IVC CI	BT	46	1.30	36.90	9.20±9.45
	AT 2nd hour	46	0.40	30.30	9.32±8.73
	AT4st hour	46	1.10	26.90	8.98±7.45

IJV AP INS: Internal Jugular Vein anterior posterior Inspiratory diameter. IJV ARE INS: IJV area Inspiratory diameter. IJV M MOD INS: M-Mod Inspiratory measures. IJV M MOD EXP: IJV M-Mod expiratory measures. IJV CI: IJV Collapsibility Index. IVC EXP: Inferior Vena Cava expiratory diameter. IVC INS: IVC Inspiratory diameter. IVC CI: IVC Collapsibility Index. BT: Before treatment AT: After treatment

Table 3. The amount of change and confidence interval between clinical measurements before and after treatment

	Hour	Change	95% CI		p
			Lower	Upper	
IJV AP INS	BT - AT 2nd hour	-0.171	-0.221	-0.121	**<0.001**
	BT - AT 4st hour	-0.301	-0.383	-0.218	**<0.001**
IJV ARE INS	BT - AT 2nd hour	-0.391	-0.590	-0.193	**<0.001**
	BT - AT 4st hour	-0.628	-0.856	-0.400	**<0.001**
M MOD INS	BT - AT 2nd hour	-0.194	-0.284	-0.104	**<0.001**
	BT - AT 4st hour	-0.323	-0.441	-0.206	**<0.001**
M MOD EXP	BT - AT 2nd hour	-0.225	-0.322	-0.128	**<0.001**
	BT - AT 4st hour	-0.393	-0.546	-0.239	**<0.001**
IJV CI	BT - AT 2nd hour	0.420	-1.907	2.748	0.718
	BT - AT 4st hour	2.004	-1.136	5.144	0.205
IVC EXP	BT - AT 2nd hour	-0.137	-0.175	-0.099	**<0.001**
	BT - AT 4st hour	-0.254	-0.308	-0.200	**<0.001**
IVC INS	BT - AT 2nd hour	-0.121	-0.166	-0.076	**<0.001**
	BT - AT 4st hour	-0.211	-0.259	-0.163	**<0.001**
IVC CI	BT - AT 2nd hour	0.118	-1.803	2.039	0.844
	BT - AT 4st hour	-0.217	-2.435	2.000	0.902

IJV AP INS: Internal Jugular Vein anterior posterior Inspiratory diameter. IJV ARE INS: IJV area Inspiratory diameter. IJV M MOD INS: M-Mod Inspiratory measures. IJV M MOD EXP: IJV M-Mod expiratory measures. IJV CI: IJV Collapsibility Index. IVC EXP: Inferior Vena Cava expiratory diameter. IVC INS: IVC Inspiratory diameter. IVC CI: IVC Collapsibility Index. BT: Before treatment AT: After treatment. 95% CI: 95% Confidence Interval

Table 4. Before and after treatment ultrasonographic measurements comparison

	Hour	Triple comp.	Double comp.	Spearman' corr.	
				rho	p
IJV AP INS	BT - AT 2. - AT 4.	**<0.001**	-	-	-
	BT - AT 2	-	**<0.001**	0.834	**<0.001**
	BT - AT 4.	-	**<0.001**	0.707	**<0.001**
	AT 2. - AT 4.	-	**<0.001**	0.908	**<0.001**
IJV ARE INS	BT - AT 2. - AT 4.	**<0.001**	-	-	-
	BT - AT 2		**<0.001**	0.834	**<0.001**
	BT - AT 4.	-	**<0.001**	0.802	**<0.001**
	AT 2. - AT 4.	-	**<0.001**	0.967	**<0.001**
M MOD INS	BT - AT 2. - AT 4.	**<0.001**	-	-	-
	BT - AT 2	-	**<0.001**	0.833	**<0.001**
	BT - AT 4.	-	**<0.001**	0.741	**<0.001**
	AT 2. - AT 4.	-	**<0.001**	0.922	**<0.001**
M MOD EXP	BT - AT 2. - AT 4.	**<0.001**	-	-	-
	BT - AT 2	-	**<0.001**	0.783	**<0.001**
	BT - AT 4.	-	**<0.001**	0.735	**<0.001**
	AT 2. - AT 4.	-	**<0.001**	0.912	**<0.001**
IJV CI	BT - AT 2. - AT 4.	0.270	-	-	-
	BT - AT 2	-	0.718	0.664	**<0.001**
	BT - AT 4.	-	0.205	0.493	**<0.001**
	AT 2. - AT 4.	-	0.169	0.725	**<0.001**
IVC EXP	BT - AT 2. - AT 4.	**<0.001**	-	-	-
	BT - AT 2	-	**<0.001**	0.905	**<0.001**
	BT - AT 4.	-	**<0.001**	0.873	**<0.001**
	AT 2. - AT 4.	-	**<0.001**	0.939	**<0.001**
IVC INS	BT - AT 2. - AT 4.	<0.001	-	-	-
	BT - AT 2	-	<0.001	0.504	<0.001
	BT - AT 4.	-	<0.001	0.912	<0.001
	AT 2. - AT 4.	-	<0.001	0.912	<0.001
IVC CI	BT - AT 2. - AT 4.	0.393	-	-	-
	BT - AT 2	-	0.819	0.661	<0.001
	BT - AT 4.	-	0.627	0.484	0.001
	AT 2. - AT 4.	-	0.403	0.811	<0.001

IIJV AP INS: Internal Jugular Vein anterior posterior Inspiratory diameter. IJV ARE INS: IJV area Inspiratory diameter. IJV M MOD INS: M-Mod Inspiratory measures. IJV M MOD EXP: IJV M-Mod expiratory measures. IJV CI: IJV Collapsibility Index. IVC EXP: Inferior Vena Cava expiratory diameter. IVC INS: IVC Inspiratory diameter. IVC CI: IVC Collapsibility Index. BT: Before treatment AT: After treatment

DISCUSSION

In this study, we identify statistically significant reduction in the values of IVC and IJV diameters after the heart failure treatment. According to these results, we think that IVC and IJV ultrasonography can be used in the evaluation of effectiveness of treatment administered to hypervolemic patients in the emergency department.

As shown in several studies, physiological IVC measurements help clinicians to predict patient's volume status (5,6). The IVC diameter was imaged in dialysis patients and heart failure patients to evaluate volume status (7,8). Similarly, it has been used in trauma patients for early recognition of hypovolemia (2). IVC diameter and collapsibility index, as it reflects the right atrial pressure, are used in the diagnosis and treatment of chronic heart failure (9-11). Cheriex et al. measured right atrial pressures by placing central catheter to jugular vein and they have identified that right atrial pressures are significantly correlated with IVC diameters (12). Marcelino et al. researched the correlation between IVC with central venous pressure (CVP) in surgical and medical intensive care unit (ICU) patients and found a correlation between IVC collapsibility indexes with CVP (13). A study by Natori conducted patients with trauma; they demonstrated a correlation between IVC diameter collapsibility ranges with CVP (14).

It is stated that IJV ultrasound, as IVC, can estimate assessment of volume status in patients (1,2,15). In studies related to IJV, the correlation between IJV diameters with CVP, as IVC, has been shown. Lipton reported a relationship between IJV diameters and CVP (16). IVC imaging is impossible in approximately 10-15% of patients in the emergency department. Bedside ultrasound for IVC imaging, applied in emergency and intensive care conditions, cannot be made properly due to obesity, full stomach or intra-abdominal gas. In addition, training of IVC imaging, according IJV may be much more difficult and time-consuming. IJV can be displayed in an easy manner with real-time ultrasound, and because it is easily applied, without the need of other physicians or laboratory results, ultrasound provides facilities for diagnosis and monitoring patients. It has been reported that serial measurements can be used to detect continuing bleeding or to monitorize treatment efficacy (1,13). Akilli et al. evaluated IVJ diameter and collapsibility index in a study conducted in blood donor healthy volunteers. They showed that significant reduction in all diameter and area measurements by comparison of pre-hemorrhagic and post-hemorrhagic data. They have argued that IVJ diameter measurement is a reliable indicator for early detection of bleeding (1).

USG of IJV shown to be useful for the assessment of hypervolemia, as hypovolemia. Siva showed that IJV diameter measurements have high positive predictive value and specificity for the diagnosis of hypervolemia (17). Yavaşi et al have evaluated the IVC diameter and IVC collapsibility index to monitorize the treatment of acute heart failure, the average IVC diameters have been measured before and after treatment during inspiration and expiration, they have detected a statistically significant decrease in IVC diameter and statistically significant increase in IVC collapsibility index after treatment, and they reported that IVC collapsibility index assist physicians in the management of acute heart failure treatment (18). Tchernodrinski administered furosemide treatment to 70 patients with acute decompensate heart failure and they reported that furosemide decreased the IVC diameter in these patients (19). Similarly, we detected a statistically significant reduction in IVC and IJV diameters after heart failure treatment.

LIMITATIONS

The largest limitations of our study are small sample size and convenience sampling. Since only the patients during the work-hours of the attending emergency physician were included all patients who had met the inclusion criteria could not be included in the study. Our study is a single-center study and the results should be regarded as hypothesis-generating and need to be confirmed in prospective multi-center trials.

CONCLUSION

As a result, IJV ultrasonography is a non-invasive, bedside and easily applied technique which performed without any difficulty as IVC ultrasonography. We think that in patients with heart failure, ultrasonographic measurements of IVC and IJV can be used to evaluate the efficacy of the treatment and hypervolemia but these finding needs to be confirmed in larger studies.

Competing interests: The authors declare that they have no competing interest.

Financial Disclosure: There are no financial supports.

Ethical approval: This study was “Declaration of Helsinki” conducted in accordance with the ethical principles stated. The ethical approval of this study was taken from the Ethics Committee of Keçiören Training and Research Hospital on 14/01/2015 (2015- B.10.4).

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Original Article

Can Early Mortality in Acute Pulmonary Embolism Be Predicted at Emergency Service?

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Abstract

Aim: The present study aimed to investigate whether the routine clinical, laboratory, and imaging examination results used in the diagnosis of Akut Pulmonary Embolism in the emergency room could be used to predict early mortality associated with the disease.
Materials and Methods: This retrospective, descriptive, and analytical study was conducted on 109 patients who were admitted to the emergency services and diagnosed with APE between January 1, 2019, and January 1, 2020. Patients who were aged ≥18 years, and who were not pregnant, had undergone computed tomography (CT) angiography, and whose data were accessible via the automation system were included in the study. The patients were divided into two groups of survivors and nonsurvivors.
Results: In the nonsurvivor patient group, the systolic, diastolic, and mean arterial blood pressure levels were statistically significantly lower ($p < 0.001$, $p < 0.001$, and $p < 0.001$, respectively), whereas the pulse and respiratory rates were statistically significantly higher ($p = 0.024$ and $p = 0.001$, respectively). The mean Pulmonary Embolism Severity Index scores, red blood cell distribution width (RDW), D-dimer and lactate levels were statistically significantly higher in the mortal group ($p < 0.001$; $p = 0.013$, $p = 0.041$, and $p = 0.020$, respectively), whereas the pH levels were statistically significantly lower in the mortal group ($p = 0.021$).
Conclusion: Early mortality is predictable in APE cases. The RDW, D-dimer, pH, and lactate values, which are routinely measured in the emergency room, can be used to predict mortality.

Keywords: Computed Tomography, emergency room, laboratory, mortality, pulmonary embolism

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INTRODUCTION

Acute pulmonary embolism is the third most common cause of cardiovascular mortality and the first most common cause of postoperative death (1). The 30-day, in-hospital, and one-year mortality rates of patients with APE were reported as 13.6%, 4.0%, and 24.1%, respectively. Rapid diagnosis at the first presentation is decisive for the purposes of both treatment and mortality (2).

The standard diagnostic approach includes taking a patient history and conducting physical examination, laboratory tests, and imaging. Furthermore, it is essential to review the risk factors associated with APE. Laboratory tests are of no diagnostic use for APE; however, they can be used to estimate the prognosis in case of clinical suspicion or diagnosis of APE. Especially high D-dimer and troponin levels have been associated with increased mortality and poor disease outcomes in APE cases (3-6). Recently, red blood cell distribution width (RDW) has come to the forefront as a predictor of mortality and severity of the disease, albeit not as an independent factor. In addition, it has been reported in some studies that crp and nlr, which are inflammatory markers, can determine the prognosis of patients with APE (7-10). Arterial blood gas (ABG) pH provides information about both the metabolic and respiratory status of patients, whereas plasma lactate levels are considered as an indicator of hypoxemia or tissue hypoperfusion severity during normal blood pressure

conditions (11). In critically ill patients, elevated plasma lactate levels are expected prior to hemodynamic disorder, and this elevation can be used in the early diagnosis of patients at high risk of short-term adverse outcome after diagnosis of APE (12).

The present study aimed to investigate whether the routine clinical, laboratory, and imaging examination results used in the diagnosis of APE in the emergency room could be used to predict early mortality associated with the disease.

MATERIALS AND METHODS

Study Population and Design

This retrospective, descriptive, and cross-sectional study included 109 patients who presented to the emergency service during the two-year period between between January 1, 2019 and January 1, 2020 pursuant to the decision by the Local Ethical Committee (Decision No. 42 dated 26.09.2019) and the Helsinki Declaration.

Human Rights

This research was conducted on humans are in accordance with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

The data in the files pertaining to patients diagnosed with I26, I26.0, and I26.9 (Pulmonary Embolism, Pulmonary Embolism Together with Acute Cor Pulmonale, and Pulmonary Embolism without Acute Cor Pulmonale, respectively) according to the International Classification of Diseases 10 who underwent lung computed tomography (CT) examination were scanned and recorded in an Excel sheet. Patients who did not survive within the first 30 days of diagnosis were included in the nonsurvivor group. The data of the patients recorded from the system were as follows:

- Demographic data (age, gender)
- Complaints at presentation to the emergency room
- Comorbidities
- Vital signs
- Pulmonary Embolism Severity Index (PESI) score and class
- Imaging information and diagnostics
- Blood tests (neutrophil, lymphocyte, NLR, D-dimer, high-sensitivity troponin I, pH, average platelet volume, and lactate)
- Measurements of right ventricular (RV)/left ventricular (LV) ratio at CT.
- Information about circulatory and respiratory support treatment provided at the emergency room.
- Patient outcome
- Information regarding mortality day

NLR was calculated and recorded as follows:

- NLR: Neutrophil count divided by lymphocyte count.

The RV/LV ratio was calculated and recorded as follows:

- The latitudinal measurements of the minor axes of the cardiac RV and LV were taken at the widest points between the inner surface of the free wall and the interventricular septum surface. It was taken into consideration that these maximum dimensions could be at different levels.

Study Inclusion Criteria

- Patients aged above 18 years.
- Patients diagnosed with APE upon CT examination.
- Patients whose data could be completely accessed through the automation system.

Study Exclusion Criteria

- Patients without imaging results
- Patients with unknown outcomes
- Patients with suspected APE diagnosis upon CT examination

Statistical Analysis

In the present study, descriptive analyses were performed for the general characteristics of the study population. Distribution tests, histogram graphs, and skewness–kurtosis were used to investigate the distribution of the data. Nonparametric tests were used for the data that did meet the hypothesis of normal distribution. Mann–Whitney U test was used for independent numerical variables. Chi-square test was used for categorical variables. Numerical variables were expressed in median values (25^{th} and 75^{th} percentiles) and categorical variables were expressed in numbers (%). A p value of <0.05 was considered as statistically significant for the purposes of the study. IBM SPSS Version 22 software program was used for the analyses.

RESULTS

The patients with APE were divided into two groups, survivors and nonsurvivors, and their data were compared in terms of demographic characteristics, vital signs, comorbidities, PESI score and class, laboratory results, ventricular diameter, treatment, and admission unit (Table 1).

A total of 109 patients who matched the study criteria were reviewed for early mortality (first 30 days after diagnosis). Accordingly, the median age was 79 years (69–82.9 years) for nonsurvivors, 70 years (56–82 years) for survivors, and 72 years (61–85 years) when all patients were considered. The patients' age in the nonsurvivor group was statistically significantly higher ($p = 0.008$). Regarding gender, most of the patients were men (n = 58, 53.2%). No statistically significant difference was found between the nonsurvivor and survivor groups in terms of gender ($p = 0.665$).

Concerning vital signs, all parameters except pulse rate were in the normal reference range. Nevertheless, the systolic, diastolic, and mean arterial blood pressure levels were lower and pulse and respiratory rates were higher in the nonsurvivor group. These differences were statistically significant ($p = 0.000$, $p = 0.000$,

Table 1. Comparison of data between the survivor and nonsurvivor groups

		Survivor (n:77)	Nonsurvivor (n:32)	Total (n:109)	*p*
Age (years)		70 (56–82)	79 (69–88)	72 (61–85)	
Gender	**Female**	35 (% 45.5)	16 (% 50.0)	51 (% 46.8)	**0.008**
	Male	42 (% 54.5)	16 (% 50.0)	58 (% 53.2)	0.665
Vital Signs	**Body temperature (°C)**	36.7 (36.5–37)	36.7 (36.6–36.8)	36.7 (36.5–37)	0.470
	Pulse (min)	110 (96–121)	120 (112–124)	115 (100–122)	**0.024**
	Systolic blood pressure (mmHg)	110 (100–120)	90 (85–110)	110 (90–120)	**< 0.001**
	Diastolic blood pressure (mmHg)	70 (60–80)	60 (50–70)	70 (60–80)	**< 0.001**
	MAP (mmHg)	86.7 (76.7–93.3)	70 (63.3–83.3)	83.3 (70–93.3)	**< 0.001**
	Respiratory rate (min	20 (18–22)	22 (20–24)	20 (18–23)	**0.001**
	Saturation (%)	92 (89–94)	91 (86–97)	92 (88–95)	0.754
Comorbidities	**Hypertension**	50 (% 64.9)	26 (% 81.3)	76 (% 69.7)	0.091
	Diabetes mellitus	10 (% 13.0)	8 (% 25.0)	18 (% 16.5)	0.124
	Coronary artery disease	15 (% 19.5)	8 (% 25.0)	23 (% 21.1)	0.520
	Congestive heart failure	13 (% 16.9)	7 (% 21.9)	20 (% 18.3)	0.540
	COPD	8 (% 10.4)	1 (% 3.10)	9 (% 8.30)	0.278
	Atrial fibrillation	15 (% 19.5)	12 (% 37.5)	27 (% 24.8)	**0.047**
	Cerebrovascular disease	12 (% 15.6)	7 (% 21.9)	19 (% 17.4)	0.430
	Chronic kidney failure	5 (% 6.50)	0 (% 0.00)	5 (% 4.60)	0.319
	Deep vein thrombosis	10 (% 13.0)	3 (% 9.40)	13 (%1 1.9)	0.752
	Other comorbidities	16 (% 20.8)	11 (% 34.4)	27 (% 24.8)	0.134
PESI	**Male**	34 (%44.2)	10 (%31.3)	44 (%40.4)	0.211
	Cancer	10 (%13.0)	10 (%31.3)	20 (%18.3)	**0.025**
	Congestive heart failure	18 (%23.4)	6 (%18.8)	24 (%22.0)	0.596
	COPD	10 (%13.0)	1 (%3.10)	11 (%10.1)	0.170
	Pulse	38 (%49.4)	24 (%75.0)	62 (%56.9)	**0.014**
	Systolic blood pressure	17 (%22.1)	21 (%65.6)	38 (%34.9)	**< 0.001**
	Respiratory rate	1 (%1.30)	4 (%12.5)	5 (%4.60)	**0.025**
	Temperature	36.7 (36.5–37)	36.7 (36.6–36.8)	36.7 (36.5–37)	0.470
	Mental alteration	4 (%5.20)	16 (%50.0)	20 (%18.3)	**< 0.001**
	Arterial saturation	21 (%27.3)	15 (%46.9)	36 (%33.0)	**0.048**
	Total points	30 (10–50)	105 (50–130)	40 (20–80)	**< 0.001**
	Class 1 (≤65)*	64 (%83.1)	10 (%31.3)	74 (%67.9)	**< 0.001**
	Class 2 (66–85)	7 (%9.10)	1 (%3.10)	8 (%7.30)	
	Class 3 (86–105)	4 (%5.20)	5 (%15.6)	9 (%8.30)	
	Class 4 (106–125)	0 (%0.00)	2 (%6.30)	2 (%1.80)	
	Class 5 (>125)*	2 (%2.60)	14 (%43.8)	16 (%14.7)	
Laboratory Parameters	**NLR**	4.34 (2.6–6.75)			
	RDW, %	16.4 (15.2–17.8)			
	PLT, Ku/L	189 (162–236)			
	MPV, fl	8 (7.03–9.06)			
	D-dimer, ugFEU/L	3560 (1800–8900)			
	HsTn I, ng/L	59 (9–285)			
	pH	7.4 (7.36–7.43)			
	Lactate, mmol/L	2.3 (1.5–2.9)			
Ventricular diameters	**LV diameter, mm**	3.2 (2.8–3.8)	3.6 (3.2–3.9)	3.3 (3.1–3.9)	**0.027**
	RV diameter, mm	4.8 (4.6–5.4)	5.2 (4.65–5.7)	4.9 (4.6–5.5)	0.161
	Right ventricle/left ventricle ratio	1.52 (1.35–1.65)	1.44 (1.2–1.58)	1.48 (1.25–1.64)	0.107
Treatment	**Thrombolytic therapy**	3 (3.90)	1 (3.10)	4 (3.70)	1.000
	Inotrope	3 (3.90)	18 (56.3)	21 (19.3)	**< 0.001**
	Mechanical ventilation	2 (2.60)	20 (62.5)	22 (20.2)	**< 0.001**
Admitted to	**Hospital ward**	18 (23.4)	1 (3.10)	19 (17.4)	**0.011**
	ICU	59 (76.6)	31 (96.9)	90 (82.6)	
Time (days) until death		-	6 (2–14)	6 (2–14)	-

min: minutes, MAP: mean arterial pressure, median (Interquartile Range): median (IQR:25th and 75th percentiles), the Mann–Whitney U test was used to compare numerical parameters. COPD: chronic obstructive pulmonary disease, other: cancer, Alzheimer's, epilepsy etc., n: number, percentage (%), Chi-square test was used to compare categorical parameters. PESI: Pulmonary Embolism Intensity Index, n: number, percentage (%), Chi-square tests were used to compare categorical parameters. *: Shows groups with significant differences. NLR: neutrophil–lymphocyte ratio, RDW: red blood cell distribution width, PLT: platelet, MPV: mean platelet volume, HsTn: high-sensitive troponin, pH: power of hydrogen, LV: left ventricle, RV: right ventricle, median (interquartile range): median (IQR: 25th and 75th percentiles), the Mann–Whitney U test was used to compare numerical parameters with each other. ICU: intensive care unit, n: number, percentage (%), Chi-square test was used to compare the categories with each other

and p = 0.000; p = 0.024 and p = 0001, respectively).

The most common comorbidity was hypertension, present in 76 (69.7%) patients. However, no statistical difference in any of the other parameters except AF was found between the groups. AF was statistically significantly higher in the nonsurvivor group (p = 0.047).

A comparison of the survivor and nonsurvivor groups regarding the parameters used in PESI calculation and calculated scores indicated that the calculated scores, cancer comorbidity, pulse rate, systolic blood pressure, respiratory rate, and mental alterations were statistically significantly more prevalent in the nonsurvivor group than in the survivor group (p < 0.001, p = 0.025, p = 0.014, p < 0.001, p = 0.025, and p < 0.001, respectively).

The results of the comparison between the survivor and nonsurvivor groups concerning the data on laboratory results and LV and RV diameters measured during CT are shown in Table 1. The RDW, D-dimer, and lactate values increased, and the pH levels statistically significantly decreased in the nonsurvivor group (p = 0.013, p = 0.041, p = 0.020, and p = 0.021, respectively). Both the LV and RV diameters showed increase in the nonsurvivor group; however, only the increase in the LV diameter was statistically significant (p = 0.027). The RV/LV ratio was decreased in the nonsurvivor group, but this was not statistically significant (p = 0.107).

A comparison of the groups by treatment, hospitalization, and time from diagnosis to death indicated that the need for inotropic therapy, mechanical ventilator use, and intensive care hospitalization were statistically significantly higher in the nonsurvivor group than in the survivor group (p < 0.001, p < 0.001, and p = 0011, respectively). The median time from presenting to the emergency room until mortality following APE diagnosis was 6 (2–14).

The univariate mortality analysis of the patients is shown in Table 2. A history of AF increased the risk of mortality by 2.48 times (1.1–6.168). Whereas, according to the PESI scores, cancer score increased the risk of mortality by 3.045 times (1.12–8.279), pulse rate score by 3.079 times (1.231–7.698), systolic blood pressure score by 6.738 times (2.721–16.684), respiratory rate scores by 10.857 times (1.163–101.348), and mental state alteration score by 18.25 times (5.377–61.937). In addition, the need for inotropic therapy increased the risk of mortality by 31.714 times (8.229–122.231), mechanical ventilator requirements by 62.5 times (12.924–302.259), and intensive care unit hospitalization requirement by 9.458 times (1.205–74.21). All these results were statistically significant (p = 0.048; p = 0.025, p = 0.014, p = 0.000, p = 0.025 p = 0.000, p = 0.000, p = 0.000, and p = 0.011, respectively).

Table 3 shows the cutoff values for parameters associated with mortality. The cutoff values for RDW, D-dimer, and lactate were 17.15% (area under curve(AUC) = 0.652, sensitivity = 63%, specificity = 65%, p = 0.013), 5362 ugFEU/L(AUC = 0.625, sensitivity = 66%, specificity = 62%, p = 0.041), and 2.45 mmol/L(AUC = 0.642, sensitivity = 59%, specificity = 60%, p:0.020), respectively.

Table 2. Univariate analysis of mortality in patients with acute pulmonary embolism presented to the emergency room

	Odds ratio	95% CI	*p*
Atrial fibrillation	2.48	(1.1–6.168)	**0.048**
PESI cancer	3.045	(1.12–8.279)	**0.025**
PESI pulse	3.079	(1.231–7.698)	**0.014**
PESI systolic blood pressure	6.738	(2.721–16.684)	**<0.001**
PESI respiratory rate	10.857	(1.163–101.348)	**0.025**
PESI altered mental status	18.25	(5.377–61.937)	**<0.001**
Need for inotropic therapy	31.714	(8.229–122.231)	**<0.001**
Mechanical ventilation	62.5	12.924–302.259	**<0.001**
ICU requirement	9.458	(1.205–74.21)	**0.011**

ICU: intensive care unit; CI: confidence interval

Table 3. The cutoff values of the laboratory parameters associated with mortality at the time of presentation to the emergency room in patients with acute pulmonary embolism

	Cut-off	Sensitivity (%)	Specificity (%)	AUC	95% CI	*p*
RDW (%)	17.15	63	65	0.652	(0.537–0.768)	**0.013**
D-Dimer, ugFEU/L	5362	66	62	0.625	(0.512–0.737)	**0.041**
Lactate, mmol/L	2.45	59	60	0.642	(0.519–0.764)	**0.020**

AUC: Area under the curve, CI: Confidence Interval

DISCUSSION

APE is characterized by high early mortality rates despite advances in its diagnosis and treatment in the last 30 years. Early diagnosis is crucial since the vast majority of patients would die within the early hours of admission (2). Autopsy studies have shown that the possibility of APE diagnosis before mortality was present only in 30%–45% of the cases (13). Hence, there is an urgent need of uncovering diagnostic parameters aimed at predicting mortality in patients with APE admitted to the emergency room.

APE is known to mostly be prevalent in the elderly population and very rarely occurs prior to puberty. Additional diseases and susceptibility to thrombosis increase with advanced age (14). A study has reported that the average age of patients with APE is 62 years, and another has reported it to be 65 years (14). Additionally, ages of ≥70 years have been associated with mortality related to APE (14,15). Like previous studies, in the present study, the average age of patients with APE was 72 years.

AF is the most common form of cardiac arrhythmia. There are two different hypotheses regarding AF in patients with APE. The first is that AF may cause APE by inducing thrombus formation in the right atrium, and the second is that AF may occur due to increased right atrium pressure associated with APE (16). A study reported the comorbidity of AF with APE to be associated with mortality (17). Similarly, in the present study, among the comorbidities, AF was associated with mortality. However, the pathophysiology behind this remains unresolved, along with whether AF is an independent risk factor for APE (18).

Objective clinical parameters are used in the calculation of the PESI score with an aim to predict mortality, and the risk of mortality is determined based on the calculated scores (19). Indeed, in the present study, the PESI scores of cancers, pulse rate, systolic and diastolic blood pressure, respiratory rate, and altered mental state items were statistically significantly higher in the nonsurvivor group. Concurrently, the fact that the mean PESI score was 105(50–130) in the nonsurvivor group and 30(10–50) in the survivor group is an important result suggesting a relationship between the PESI scores and mortality.

The RDW values indicate the range of red blood cell sizes (20). Previous studies have reported RDW values to be strongly associated with the prognosis of cardiopulmonary diseases (including acute myocardial infarction, coronary artery disease, heart failure, and pulmonary hypertension) and that elevated RDW value were associated with an increased risk of mortality of patients with cardiopulmonary diseases (21). RDW values have been recommended to be employed, especially in combination with the PESI scores, to predict mortality rates related to APE more successfully (22). The results of the present study, consistent with the literature, demonstrated a higher RDW value in the nonsurvivor group. In particular, a direct correlation between the RDW cutoff values of ≥17.15% and mortality were observed. In the light of the abovementioned results, RDW values should be carefully considered, especially in terms of predicting mortality in patients with suspected APE.

Plasma D-dimer, known as the fibrin degradation product, has become an important tool, especially in the diagnosis of venous thromboembolism (23). A limited number of studies have investigated the relationship between D-dimer levels and mortality. A study reported that D-dimer levels of ≥5000 ng/mL increased the risk of mortality by 2.9 times (24). Another study reported that very high concentrations of D-dimer (>8 μg/mL) were associated with poor outcomes in ≥50% of the APE cases (24). Consistent with the literature, the elevated D-dimer values were directly related to mortality in the present study. It was concluded that D-dimer values of ≥5000 ng/mL should be taken into consideration, especially in terms of predicting mortality associated with APE.

Lactate levels reflect tissue hypoperfusion. The fact that lactate level increases before clinical manifestations and hemodynamic disorder and that it can help with the early diagnosis of patients at high risk of short-term adverse outcomes, makes lactate an important measurement (12). A study conducted on patients with APE found that lactate levels of ≥2 mmol/L increased mortality by nearly 10% (12). Similarly, two different studies showed that plasma lactate levels had a strong predictive value regarding short-term prognosis of APE (11,12). Another multicenter prospective study reported that higher levels of troponin and plasma lactate concentrations combined with RV dysfunction posed a moderate to high risk of mortality (25). In the present study, lactate levels of >2.45 mmol/L were associated with mortality, which is statistically significant as well as consistent with the relevant literature.

CT angiography has now become the first-choice diagnostic imaging procedure for patients with suspected APE in the emergency room (26). It was shown that the prognosis of APE was associated with the degree of severity of functional pulmonary circulation and RV dysfunction (27). The RV and LV diameters and their ratios can be easily measured by CT. A RV/LV ratio limit value of >1.0 was shown to be usually associated with RV dysfunction and predicted short-term adverse outcomes and mortality (28). Furthermore, a RV/LV ratio >1.0 in the present study supports the hypothesis that this value could be considered in APE. At the same time, it is imperative that a CT procedure is routinely requested for the purposes of diagnosis of APE at the emergency room so that this ratio can be easily calculated. However, since no difference was found between the survivor and nonsurvivor groups regarding RV/LV ratio in the present study, it suggests that there may be secondary factors that have an impact on the abovementioned ratio. This conclusion should be further evidenced via future studies.

The diagnosis and treatment strategies for APE are greatly affected by the clinical characteristics and hemodynamic conditions of the patients. In fact, in the present study, there was a significant relationship between mortality and certain

parameters, including inotropic use, mechanical ventilation need, and ICU hospitalization, which can provide an idea regarding the hemodynamic situation of patients. A similar result was reported in a study by Kasper et al (29).

LIMITATIONS

Our study is retrospective and is not multicentered. There may have been deaths from other causes within 30 days.

CONCLUSION

In conclusion, early mortality in APE can be predicted. The RDW, D-dimer, pH, and lactate values, which are routinely used in the emergency room, along with patients' PESI scores, can be used to predict APE-associated mortality.

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Original Article

The Effect of Breastfeeding Education in a Family Health Center on Breastfeeding Attitudes and Behavior

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Abstract

Aim: To determine the breastfeeding attitudes and behavior of pregnant women and puerperium enrolled in a Family Health Center, and to evaluate how breastfeeding education affects breastfeeding attitudes by providing breastfeeding education and eliminating a lack of knowledge.
Materials and Methods: The cross-sectional and analytical study consisted of a total of fifty-two participants, forty-six pregnant women and six puerperium, who received services from Family Health Centers All of the participants were given face-to-face Ministry of Health breastfeeding counseling training by the researcher, and were evaluated with the Breastfeeding Attitude Rating Scale (BARS) before and after the training.
Results: The mean age of the participants was 30.98 ± 5.71 years, with the majority (98.1%) being married. 84.6% of the participants lived in urban areas and 15.4% in rural areas. The difference in the BARS score between pre-training and post-training was statistically significant ($p<0.001$), revealing that those participants living in urban areas had a significantly higher increase in the BARS score than those living in rural areas ($p = 0.032$).
Conclusion: It is clear that mothers have positive attitudes towards breastfeeding, are open to education and that they benefit from education. For this reason, it is very important for health institutions to receive the title of 'Baby Friendly Health Institution', to provide prenatal and postnatal breastfeeding education and to ensure the continuity of breastfeeding education so that babies receive only breast milk in the first six months and continue until the age of 2 years.

Keywords: Breastfeeding education, family health centre, breastfeeding attitudes and behavior

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INTRODUCTION

Breast milk is an ideal food source for infants. It is safe, clean and rich in antibodies (1). Breast milk intake increases the level of intelligence and reduces the risk of gastroenterinal system diseases, allergic diseases, asthma, cardiovascular diseases, cancer risk, obesity and diabetes. It also reduces the risk of breast and ovarian cancer (1-3). Initiatives to increase breast milk intake are important against child mortality as they have the potential to prevent 13% of all under-five deaths in developing countries (4). The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend exclusive breastfeeding for the first six months of life, and breastfeeding for at least two years with safe and appropriate supplementary foods after the sixth month (5,6). In 1990, with the 'Innocenti Declaration', a baby-friendly hospital initiative was launched to protect and support breastfeeding. This program has been continuing in Turkey since 1991, run by the Ministry of Health as the 'Breast Milk Promotion and Baby Friendly Health Institutions' program (7). Although this program has increased breast milk intake over the years, the desired levels have not been reached. According to the 2013 data of the Turkish Population and Health Survey (TDHS), the rate of exclusive breastfeeding between 0-5 months is 30.1%, and the rate of bottle feeding is 39.7%. At 20-23 months, the rate of those who were not breastfed was reported to be 66%. According to the TDHS 2018 data, 40.7% of children received only breast milk in the first six months. While the rate of breastfeeding until two years of age is 33.5%, 53% of infants aged

0-23 months were bottle-fed. In 4-5 months, the rate of exclusive breastfeeding was 14%, which is quite low, and supplementary foods were introduced early (8,9). Worldwide, the rate of infants receiving only breast milk in the first six months is 41%, which is below the World Health Organization and UNICEF's target of 67% in 2030 (10). One of the main reasons why breastfeeding is not at the desired level is a lack of knowledge and the attitudes of mothers regarding breast milk and breastfeeding, which are highly correctable within the health system. The '10 Steps to Successful Breastfeeding' training, adopted by the Ministry of Health, is implemented in all baby-friendly units. Primary care has an important position in the health system in terms of being easily accessible, requiring less cost and ensuring continuity. Therefore, we believe that breastfeeding education will increase breastfeeding success and continuity by positively affecting knowledge, attitudes and behavior related to breastfeeding. In this study, our aim is to determine all the knowledge deficiencies and behavior of pregnant women and puerperium registered in our ASM, and to evaluate how breastfeeding education affects breastfeeding attitudes by eliminating the lack of knowledge by providing breastfeeding education.

Mothers who are older than eighteen years of age, have at least a primary school education, have the ability to speak and understand Turkish, do not have a disease related to breastfeeding, are open to communication and cooperation, and who accept the research, will be included in our study.

MATERIALS AND METHODS

The population of the study consisted of a total of seventy-one mothers, fifty-seven pregnant women and fifteen postpartum women, registered in Tirebolu FHC No: 1. G-Power analysis was used to calculate the sample size and assuming d=0.80 (large) effect size difference to be clinically significant, using the simple random sampling method, it was calculated that at least twenty-three mothers could represent the universe according to the effect size with a 5% acceptable type 2 margin of error (with 95% power) and a 95% confidence level.

Data were obtained using a questionnaire form including socio-demographic information of the mothers and the 'Breastfeeding Attitude Scale' developed by Arslan. This scale, which will be applied to the mothers who agreed to participate in the study, consists of a total of forty-six questions, including twenty-two positive and twenty-four negative attitudes. The positive attitudes were scored as completely agree 4-3-2-1-0, and the other sentences were considered negative with reverse scoring being conducted as completely agree 0-1-2-3-3-4. The total score of the scale is 184. The scale was repeated immediately after the training given to the mothers based on the ″Pictorial Breastfeeding Guide and Breastfeeding Counseling Practitioner Book″ recommended by the Ministry of Health for Baby-Friendly Healthcare Organizations, and the post-training score before and after the training. The score of positive items is 88 and the score of negative items is 96. The higher the score, the more positive the breastfeeding attitude is considered to be. The data to be obtained from the study were collected by the researchers using the face-to-face interview technique with the mothers included in the sample.

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA). To assess normality, we used the Shapiro-Wilk test. Continuous variables were reported as either mean ± standard deviation or median (minimum- maximum) depending on their distribution, while categorical variables were reported as frequency (%). Paired samples t-tests were used for normally distributed repeated measurements. Linear regression analyses were performed to identify significant factors independently associated with the difference in the Breastfeeding Attitude Rating Scale (BARS) scores. A two-tailed p-value of less than 0.05 was considered statistically significant.

RESULTS

The study included participants with a mean age of 30.98 ± 5.71 years, with the majority (98.1%) being married. Of the participants, 84.6% lived in urban areas, and 53.8% had previous breastfeeding experience. Additionally, 38.5% reported receiving previous training on breastfeeding, with 17.3% receiving training at a hospital and 15.4% at a family health center. Considering the economic status of the participants, 69.2% stated that their income belonged to their expenses. 53.8% of the participants had breastfeeding experience and 38.5% mothers had received breastfeeding training before.

Before the training, the mean BARS score was 110.65 ± 13.05, while the mean score after the training was 120.98 ± 10.33, resulting in an average increase of 10.33 ± 13.99. The difference in the BARS score between pre-training and post-training was statistically significant (p<0.001, Table 1).

A linear regression analysis was performed to evaluate the factors independently associated with the change in the BARS score after training. The analysis reveals that participants living in urban areas had a significantly higher increase in the BARS score than those living in rural areas (p = 0.032, Figure 1).

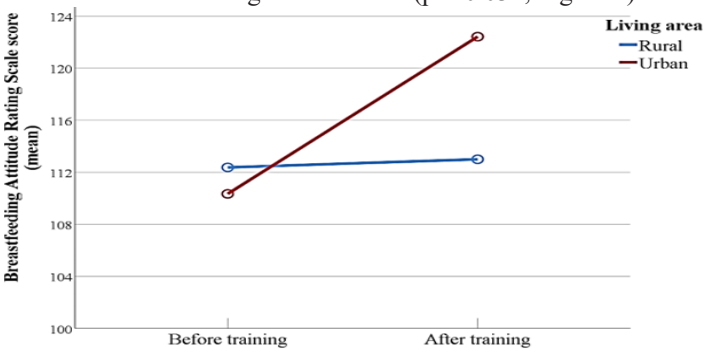

Figure 1. Breastfeeding Attitude Rating Scale score according to living area before and after training

None of the other evaluated factors (age, marital status, education level, working status, economic status, health insurance status, pregnancy status, number of living children, number of current pregnancy, time of first breastfeeding after birth, previous breastfeeding experience, previous breastfeeding training, and place of previous breastfeeding training) were found to have a statistically significant association with the difference in the BARS score (p>0.05 for all, Table 2).

Table 2. Significant factors independently associated with Breastfeeding Attitude Rating Scale score change after training, linear regression analysis results

Variables	Unstandardized coefficients (95% CI)	Standardized coefficients	*p*
Age	-0.050 (-0.747 - 0.646)	-0.021	0.885
Marital status, maried	-22.765 (-50.690 - 5.161)	-0.226	0.108
Working	3.215 (-4.700 - 11.131)	0.115	0.418
Education status	3.183 (-1.894 - 8.259)	0.175	0.214
Economic status	6.034 (-0.924 - 12.992)	0.239	0.088
Health insurance, insured	-12.271 (-26.627 - 2.085)	-0.236	0.092
Living area, urban	11.466 (1.053 - 21.879)	0.299	0.032
Number of pregnancy	-1.330 (-4.917 - 2.258)	-0.105	0.460
Breastfeeding experience, present	-2.024 (-9.900 - 5.852)	-0.073	0.608
Number of living children	-0.908 (-5.042 - 3.225)	-0.062	0.661
Pregnancy status, postpartum	3.775 (-8.500 - 16.050)	0.087	0.540
First breastfeeding time of those giving birth	1.971 (-2.346 - 6.288)	0.165	0.359
Unplanned pregnancy	-3.000 (-12.051 - 6.051)	-0.094	0.509
Previous breastfeeding training, absent	-0.688 (-8.777 - 7.402)	-0.024	0.865

Dependent variable: Breastfeeding Attitude Rating Scale score change after training, CI: Confidence interval, F=4.891(more in urban residents, p=0.032)

DISCUSSION

The primary care medicine is primarily 'preventive medicine' in line with the principle of 'preventive medicine' practice. It has been particularly attractive with its services in rural areas and its pre- and post-pregnancy training.Similar to study, the rate of prenatal breastfeeding education in the literature is unfortunately not at the desired level. In the study conducted by Yakar et al. 51.9% of the mothers not receive prenatal education (11).In the study conducted by Kumar and Mundhra, it was shown that 82.8% of the mothers did not receive any education about breastfeeding before pregnancy and the rate of those who received education from health personnel was 17.2% (12).

In this study, the breastfeeding attitude evaluation scale used to evaluate mothers' attitudes indicating that their breastfeeding attitude was positive. In one study, similar to our finding, the mothers' scale mean score was high and showed that their attitudes were positive (13). But in another research it was found that about one in five women had positive attitudes toward breastfeeding, while the majority had neutral attitudes (14). Another study found that mothers' breastfeeding attitudes were positively associated with breastfeeding knowledge (15).

Similar to study, a significant difference was found before and after the training in the study conducted by Kampenar and Darwent (15). The fact that the scale was administered again immediately after the training may have affected the result. No significant relationship was found with the difference in the scale scores of mothers who had previously breastfed or received training. This may be due to the forgetting of information and experiences over time. Studies have shown that breastfeeding education given during and after pregnancy positively affects the attitudes and behaviors of mothers and increases breastfeeding (16,17,18). All these show that pregnant women have positive attitudes towards breastfeeding and this is an opportunity for education. People are better motivated for the subjects they are interested in and benefit more from education. Of course, when we look at the results of previous studies, it should not be ignored that the continuity of education is also very important in achieving the desired success in breastfeeding.

Among the socio-demographic data we used, only a significant difference was found in the breastfeeding attitude evaluation scale score between urban and rural areas. This may be related to factors such as awareness, being more open to communication, concentrating better, and not having time constraints among mothers living in urban areas. In this respect, the study by Laksona et al. overlaps with our study (19). No significant relationship was found between other socio-demographic data and the difference in breastfeeding scale score. Other studies have shown that socio-demographic data affect breastfeeding. In the study conducted by Mekebo et al. the difference between the mothers' education level, employment status, family structure, education about breast milk and breastfeeding, and the number of living children and exclusive breastfeeding in the first 6 months was found to be statistically significant (20). Although the findings of our study do not include the behaviors and breastfeeding durations of mothers, we believe that the effects of socio-demographic data on breastfeeding will change positively if the quality and continuity of breastfeeding trainings are ensured.

CONCLUSION

It is clear that mothers have positive attitudes towards breastfeeding, are open to education and benefit from education. For this reason, it is very important for health institutions, especially primary care institutions, to receive the title of 'Baby Friendly Health Institution', to provide prenatal and postnatal breastfeeding education and to ensure the continuity of breastfeeding education so that babies receive only breast milk in the first six months and continue until the age of 2 years.

Competing interests: No conflict of interest was declared by the authors.

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Ethical approval: This Randomized controlled study was obtained from the Giresun University Training and Research Hospital (16.01.2023/06). In addition, permission was obtained from the Giresun Provincial Health Directorate where the study will be conducted (E-21625095-000-207868990). Participation in the study was voluntary, consent was obtained from the participants.

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Original Article

An Analysis Study on the Relationship Between Cerebrovascular Events and Daily Weather Changes in Çanakkale

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Abstract

Aim: In this study, we investigated a relationship between stroke and weather, humidity, wind speed, pressure, and temperature.
Materials and Methods: This study has been performed at Çanakkale Onsekiz Mart University Faculty of Medicine emergency service, and Çanakkale State Hospital emergency service between January 2012 to December 2014 with non-traumatic patients diagnosed with ischemic or hemorrhagic stroke. The study is done retrospectively. We recorded patients' age, sex, history of chronic disease, white blood cells, hemoglobin, hematocrit, platelet, red cell distribution width, mean platelet volume, urea, creatinine, sodium, potassium, percentage of lymphocytes, percentage of neutrophils, stroke type, atrial fibrillation, the 30-day mortality retrospectively in hospitals automation systems The average daily temperatures and atmospheric pressure, humidity, wind speed, and direction; has been taken and analyzed from the Ministry of Forestry and Water Affairs General Directorate of Meteorology. The statistical analysis was made with Chi-square and Pearson correlation test.
Results and Conclusion: A total of 1397 patients were studied retrospectively. The mean age of men was 69.89 ± 12.96 and the mean age of women was 75.62 ± 11.8. The mean age of women to have a stroke was found to be statistically significantly higher than that of males. When the cases were analyzed depending on the season, there was a significant increase in summer and autumn. In the cases that had a stroke, the most frequent risk factor was found to be hypertension. For patients with a history of cerebrovascular disease than any other chronic disease; mortality was significantly better. For patients who died within 1 month; white blood cell values were significantly higher compared to survivors. Men's stroke patients' hemoglobin and creatinine values were significantly higher. Pressure and wind speed parameters showed no association between stroke types, but the incidence of ischemic stroke increased at higher temperature levels and lower humidity values.

Keywords: Humidity, pressure, stroke, temperature, wind speed

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INTRODUCTION

In emergency service applications, there may be applications due to acute and chronic diseases. While there may be applications with acute conditions of chronic diseases such as emergency applications of cancer patients with oncological emergencies (1), and applications due to the trauma of geriatric patients (2), comorbid conditions that will ensure emergency service attendance can also occur after acute conditions such as stroke. Although cerebrovascular diseases are seen with a 1% probability of complaints due to many different reasons such as syncope, it is important to investigate all causes of stroke in the emergency department because of its high mortality and morbidity (3).

While tobacco smoking, hypertension, diabetes mellitus, obesity, hypercholesterolemia, sedentary lifestyle, and eating habits are very well-known risk factors for stroke; the relation between meteorological changes and stroke -and many other diseases- has not been fully understood yet. The effects of meteorologic parameters and their daily fluctuations on human health have also been the subject of other studies. Whether there is a correlation or not between seasonal differences

and diseases is yet to be discovered (4). A study which was conducted in the USA, California; shows an association between hospitalizations for cardiovascular events and weather changes. Similarly, another study from Korea has revealed a tie between low-temperature levels and ischemic stroke (5). Lots of other studies were conducted on the correlation between atmospheric parameters and stroke. Some of them have suggested that there was a connection (6-9). Despite the studies and publications, a consensus has not been established on whether meteorological changes might affect cerebrovascular disease incidences or not. The main reason for this confusion is the conflicting results that were obtained from these studies (10,11).

Primary prevention is as vitally important as the diagnosis and treatment of patients that have a cerebrovascular disease (stroke). Stroke is an expensive clinical syndrome to treat and causes a decrease in life quality. For these reasons, many studies were conducted on early diagnosis and to lower the costs of stroke diagnosis and treatment. Because predicting stopping the natural course of the disease before the stroke occurs, is less expensive to cure the disease after the dramatic outcomes and the complications set in. For this purpose, in this study, we searched for the relationship between cerebrovascular events and her conditions, humidity, wind speed, temperature, and pressure.

MATERIALS AND METHODS

This study was carried out in Çanakkale Onsekiz Mart University Faculty of Medicine Emergency Service and Çanakkale State Hospital Emergency Service with the approval of the ethics committee (Ethics committee project code: 2011-KAEK-27/2015-136).

The patients that were diagnosed with ischemic and hemorrhagic stroke who presented to Çanakkale Onsekiz Mart University and Çanakkale State Hospital emergency service between January 2012 and December 2014 were involved in this study.

The patient's age, gender, the date and time of the stroke, stroke type, 30-day mortality, and hospital archive records were studied retrospectively.

To assess the 30-day mortality, the hospitals' archive records and the entries in the hospital automation system were analyzed. The cases that were found to be dead during their admission to the hospital or in their control checks, were considered to be significant in the sense of mortality assessment. Daily minimum and maximum atmospheric pressure and temperature values, humidity, and the direction and speed of winds were taken from the Ministry of Forestry and Water Affairs General Directorate of Meteorology records. The patients who were over 18 years old when they presented to the emergency service, and were diagnosed with ischemic and hemorrhagic stroke and admitted to neurology, neurosurgery clinics, and intensive care units were involved in the study. The stroke cases that were sent from municipality hospitals that are in Çanakkale province were also included in the study. Cases related to trauma were excluded from the study.

Statistical Analysis

Data were loaded into SPSS 17.0 program. Continuous variables with normal distribution were calculated as mean ± standard deviation; parameters without the normal distribution have been calculated as the median (minimum-maximum) and the categorical variables were expressed with numbers and percentiles. Statistical significance was determined between the mean values of the groups in continuous variables; the Mann Whitney-U test was used in groups without normal distribution and the Student t-test was used in the groups with a normal distribution. To test the statistical significance of categorical variables, Pearson chi-square and when appropriate Fisher's exact test was used. All the calculations were analyzed in two ways. Values; when $p<0.05$ were accepted as statistically significant.

RESULTS

The data's of the 1397 cases that were diagnosed with ischemic and hemorrhagic stroke who presented to Çanakkale Onsekiz Mart University and Çanakkale State Hospital emergency service between January 2012 and December 2014 were retrospectively analyzed. Of 1096 days, 1214 patients who presented with ischemic stroke were admitted in 903 days, and in 193 days there were no admittances. 183 patients who presented with hemorrhagic stroke were presented in 175 days, and in 941 days there was no hemorrhagic stroke case. Of the cases in the study, 745 patients (53%) were male, and 652 (47%) were women. There was no significant difference according to gender in all of the stroke cases in the study (Table 1).

Table 1. The relationship between gender and age

	Sex	n	Mean	SD	*p*
Age	Man	745	69.89	12.96	**0.002**
	Woman	652	75.62	11.80	

When the cases were analyzed according to age and gender, the mean age for males was 69.89 ± 12.96; and the mean age for women was 75.62 ± 11.8. The mean age for women who had a cerebrovascular event was significantly higher. (p:0.002) (Table 2).

Table 2. The relationship between gender and stroke

	Man (n:745)	Woman (n:652)	*p*
Hemorrhagic stroke	104	79	0.197
Ischemic stroke	641	573	0.110

In both genders, ischemic stroke was the most common with 1114 cases, and there was no statistically significant difference between hemorrhagic and ischemic stroke between genders.

In ischemic stroke cases, women had an increase between ages 80-85, while male cases were distributed between 65-85. As in

hemorrhagic stroke cases, young ischemic stroke cases were also more frequent in male cases.

When stroke distribution according to months was analyzed, an increase in summer and autumn can be seen. The admittance increases in July, and there is a high number of hospital admittances until September. The most cases were in August with 150 cases, and the last cases were in November with 107 cases. All of the stroke cases had increased in the summer and autumn months, while hemorrhagic stroke cases were peaking in the months of February and April. Ischemic stroke cases were peaking in November, and whereas having an increase in admittance in the months of June and November.

In the city of Çanakkale, according to the data that were acquired from the Ministry of Forestry and Water Affairs General Directorate of Meteorology between January 2012 and December 2014, the mean atmospheric parameters were according to how it is presented in the table, the mean temperature being 16,65 in the 3 years. The lowest temperature was -4, the highest was 30,7. The average humidity was 72.29%, with a minimum of 37.7% and a maximum of 99%. The mean pressure was 1014,71 hectopascal (hPa), with a minimum of 990.1 hPa and a maximum of 1124.20 hPa. The average wind speed was 3.63 msec (Table 3).

Table 3. Minimum, maximum, and mean atmospheric parameters

	Min.	Max.	Mean	SD
Temperature	-4.00	30.70	16.65	7.95
Humidity	37.70	99.00	72.29	13.99
Atm. pressure	990.10	1124.20	1014.71	6.72
Wind speed	0.80	14.30	3.63	1.77

The table shows whether the atmospheric parameters have an effect on ischemic stroke which is one of the main starting points of the study (Table 4).

Table 4. The comparison of the days with and without ischemic stroke cases with the atmospheric parameters

	Ischemic stroke	Other Days	*p*
Temperature	16.88±7.94	15.71±7.97	**0.025**
Humidity	71.87±13.87	74.06±14.40	**0.016**
Atm. pressure	1014.68±5.91	1014.79±9.37	0.848
Wind speed	3.61±1.79	3.66±1.69	0.729

In the parameters of wind speed and atmospheric pressure parameters, there were no significant differences between the days with ischemic stroke and the days without an ischemic stroke, while there was a difference in high temperature and low humidity in the days of hospital admittance with ischemic stroke ($p<0,05$) (Table 4).

In the table where the atmospheric parameters in the days with and without hemorrhagic strokes, it was found that there was no effect of atmospheric events on hemorrhagic stroke incidence (Table 5).

Table 5. The comparison of the days with and without hemorrhagic stroke cases with the atmospheric parameters

	Hemorrhagic stroke	Other Days	*p*
Temperature	15.61±7.88	16.79±7.96	0.060
Humidity	73.99±14.35	72.06±13.93	0.079
Atm. pressure	1014.94±6.90	1017.67±6.70	0.626
Wind speed	3.57±1.54	3.63±1.80	0.653

One of the most important aims of our study is to analyze the relationship between atmospheric events with stroke types. There was no relationship found between temperature, humidity, and wind speed parameters and the hemorrhagic and ischemic stroke types. When looked at the table above, only the pressure values were found to be statistically significant between ischemic and hemorrhagic stroke types, when the atmospheric events and the types of stroke were analyzed (p:0.016).

When the hemorrhagic and ischemic strokes were compared, the pressure values on the days with hemorrhagic stroke were found to be statistically significantly high (Table 6).

Table 6. The relationship between the stroke type and the atmospheric changes

		n	Mean	SD	*p*
Temperature	Ischemic	1214	16.88	7.94	0.565
	Hemorrhagic	183	15.61	7.88	
Humidity	Ischemic	1214	71.87	13.87	0.423
	Hemorrhagic	183	73.99	14.35	
Atm. pressure	Ischemic	1214	1014.68	5.91	**0.016**
	Hemorrhagic	183	1014.74	6.90	
Wind speed	Ischemic	1214	3.62	1.79	0.403
	Hemorrhagic	183	3.57	1.54	

Having a prior history of stroke, did not provide a protective effect from the atmospheric events (Table 7).

Table 7. The relationship between the stroke type and the atmospheric changes

	Stroke	n	Mean	SD	*p*
Temperature	Yes	94	16.50	7.76	0.520
	No	1033	16.66	7.97	
Humidity	Yes	94	72.87	13.11	0.267
	No	1033	72.25	14.06	
Atm. pressure	Yes	94	1015.34	6.72	0.465
	No	1033	1014.66	6.72	
Wind speed	Yes	94	3.84	1.80	0.768
	No	1033	3.61	1.77	

DISCUSSION

Compared to the other studies, we have found variable results about the relationship between stroke and gender. The mean age was found to be 72.54 among the patients who were included in our study. The mean age of the males and the females were 69.89±12.96 and 75.62±11.8, respectively. Except for the Kumar et al. study and Raj et al. study, stroke cases also occur around the age of 70 and occur statistically significantly at a later age for women in other studies as was found in our study. The reason for Raj et al. and Kumar et al. studies' yielding different results might be because the studies were done in India, different living conditions, and the healthcare system in India (12,13)

When the stroke types were analyzed, in our study the most frequent type was ischemic stroke with 1114 (79%) cases and then hemorrhagic stroke with 183 cases. Similar to the other studies, ischemic stroke was more frequent than hemorrhagic strokes.

In our study 641 of the ischemic stroke cases (57%), and 104 (56%) of hemorrhagic stroke cases are men. In other studies, there are different results between the stroke types and gender. When the literature is checked, the risk for males to have a stroke until the age of 75 is higher than that of women, while the lifelong prevalence is higher in women (14). While the actual reason is not clear, the reason for the stroke incidence is higher for women, even having a higher risk on colder days, can be related to the estrogen-associated alfa-2c receptor activity (15,16). Especially in postmenopausal women, because of the low estrogen levels, the ratio of being affected by meteorological changes may be higher (8).

When the relationship between the meteorological events and ischemic stroke is considered, there was found to be no correlation between hemorrhagic stroke and temperature, while ischemic stroke cases were observed more in higher temperatures. The mean temperature for ischemic stroke was 16,88 ± 7,94 while the mean temperature for the days with hemorrhagic stroke was found to be 15.61 ± 7.88. Many other studies were conducted on the relationship between temperature and stroke. Coşan et al. have found a relationship between hemorrhagic strokes and air temperature (17). On the days when the air temperature was lower, the number of cases was higher. However, when subtypes were analyzed, the daily air temperature could not be related to the cases with a ruptured aneurysm. As it was discussed in this article before, this situation is related to increased blood pressure and sympathetic activity in cold weather (18).

According to Chen et al.' study, there was an almost two-fold increase in intracerebral hemorrhage on cold days (lower than 17.3 degrees) when compared to hot days (higher than 27.3 degrees) (19). According to Rothwell et al., even though there is an increase in hospital admittances due to intracerebral hemorrhage on cold days, no seasonal correlation was found (20).

As there are studies that defeat the relationship between cold weather and stroke cases (21-23), there are also studies that state that there is no correlation between stroke and weather parameters. (24-26). Studies in different geographic climates may yield very different outcomes (27).

There are multiple biological mechanisms behind an increase in the stroke risk in both cold and hot weather (9). In cold weather vasoconstriction, increased blood pressure, increased platelet aggregation, sympathy activation, increased c-reactive protein levels, fibrinogen levels, and activated factor VII levels can be observed (28,29).

With an increase in temperature, vasodilatation for the body's thermoregulation need, increased heart rate (cardiac output), and perspiration may result in a lowering of the blood flow to the brain and ischemia. Moreover, dehydration increased blood viscosity and cholesterol levels, and red blood cell concentration can also cause microvascular thrombosis and stroke (16). Lastly, increased temperature is also associated with bad endothelial function (30). We also found in our study that there was an increase in ischemic stroke frequency in high temperatures. There are still studies being carried on to shed light on the pathophysiology of the relationship between temperature and stroke.

When atmospheric events and mortality relationship is analyzed, there wasn't a statistically significant relationship between temperature, humidity, pressure, and wind speed, and mortality in our study. Average values on the days with and without mortality are close and not significant. Many studies have attempted to light the relationship between temperature and mortality (31,32). In Curriero et al.' study that was carried on in 11 different cities in the USA, in all of them, mortality was increased with decreasing temperature (33). In Lanska et al.' study, stroke mortality increases in winter and has a close relationship with respiratory infections (34). In the studies in Italy and Taiwan, it was suggested there was a seasonal relationship in stroke mortality (35,36).

In our study, another parameter that was found to be statistically significant was the pressure value when hemorrhagic and ischemic stroke cases were compared. On the days with ischemic stroke, the mean pressure value was 1014.68 ± 5.91 while on the days with hemorrhagic stroke, the mean pressure value was 1014.94 ± 6.9. When assessed statistically, the difference between them was found to be significant. In the study of Güneş et al., on the days of spontaneous cerebral hemorrhage and subarachnoid hemorrhage cases, the mean atmospheric pressure was 1016.0 Mb (997.0 - 1032.5 Mb) and the average daily change in the atmospheric pressure was 0,3 Mb (-13.3 - +9.2 Mb) (37). Atmospheric pressure and its daily fluctuations could not be associated with cerebral hemorrhage, subarachnoid hemorrhage, and aneurysm rupture respectively. There was also no relationship found between the ages of the cases and the daily mean atmospheric pressure. Between 24-hour atmospheric pressure change and the number of cases, there was an increase

in ischemic stroke incidence if the pressure change in 24 hours was low. In the same study, apart from daily pressure, there was no correlation between air temperature, relative humidity, and maximum wind speed, however, if the maximum wind speed was low 3 days ago, there was a significant increase in ischemic stroke risk (38).

When the hemorrhagic and ischemic stroke cases were separated as lower and higher than the age of 65, there was no statistically significant difference between young and old cases in being affected by atmospheric parameters. In the study of Wang et al., there was a %12-15 increase in hemorrhagic stroke cases under the age of 65, when there was a 1-degree temperature increase in winter. In the same study, there was a %3 increase in ischemic stroke cases above the age of 65, when there was a 1-degree temperature increase in winter. (39)

In our study, while there was not a clear relationship between the stroke cases and the atmospheric events in wind speed and pressure parameters, there was an increase in ischemic stroke cases in high temperatures and low humidity. Cowperthwaite et al. have argued a probable relationship between daily cases and temperature and atmospheric pressure (40). Chen et al. (19) suggested a relationship between daily cases and daily temperature, pressure, and relative humidity, while Field et al. (10) suggested a relationship between daily cases and average daily temperature, pressure, mean wind speed, maximum wind speed, southwester (Chinook) wind. Moreover, according to Jimenez-Conde et al., there is a relationship correlating to whether the daily weather is sunny, cloudy, or snowy (38).

Cooke et al. came up with a relationship between migraines and a wind that is called Chinook in the continent of America and has a direction from south-southwest to west-northwest and can change the temperature by 3 degrees after gusting for an hour with a speed of 15 mph (41) but its mechanism is not clear.

When all these studies are taken into consideration, it can be seen that there are data about atmospheric events which are even contradictory to each other. This brings to mind that the mechanisms are not fully clear or the stroke risk factors are too multifactorial to be able to be explained only by the weather conditions.

CONCLUSION

In this study, the relations between cerebrovascular events(stroke) and pressure, humidity, wind speed, and temperature are investigated and the results are as follows:

1. An increase in stroke cases was discovered during the summer and autumn months in the city of Çanakkale
2. No relation was found between atmospheric parameters and mortality
3. No correlation was detected between stroke and wind speed and pressure
4. Higher temperature levels and low humidity rates were recorded on the days with a higher incidence of ischemic stroke
5. When the pressure levels on the days with the hemorrhagic stroke were compared to that of the days with ischemic stroke, there were significantly higher pressure levels on the days with the hemorrhagic stroke cases.

When the observations and the literature were investigated quite different conclusions are noticed. Weather conditions alone are hard to accept as a risk factor or predictor for stroke. Weather events in different geographical areas have different influences on societies and it is difficult to give a general opinion as a conclusion.

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Original Article

Evaluation of Treatment Adherence and Lifestyle Change in Hypertensive Individuals

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Abstract

Aim: We aimed to evaluate adherence to treatment and lifestyle change recommendations in hypertensive individuals.
Materials and Methods: Individuals older than 18 years and receiving hypertension treatment for the last 6 months were included. Patients were randomized by age and gender. A questionnaire was applied to analyze the sociodemographic characteristics of both groups and to assess the treatment adherence and life change success of hypertensive individuals.
Results: The groups were similar in terms of age, marital status, educational status, economic status. 50% (n=70) were female and 50% (n=70) were male. The mean age of the participants was 59.78±11.65 years (similar in both genders). It was found that there was no statistical difference between the values of Compliance to Treatment score according to gender (p=0.408). Adherence to Treatment and Life Change Success total score values did not differ according to gender (p=0.144). The relationship between age and adherence to medical treatment score was statistically significant as sperman correlation value (r=0.260) (p=0.002). The relationship between age and salt and prepared food consumption score was significant (r=0.294; p<0.001). The relationship between age and physical activity and weight control was statistically significant (r=0.212; p=0.012).
Conclusion: Adherence and lifestyle changes are important factors for hypertension treatment and health professionals should use appropriate tools to assess these factors. These assessments can help patients adopt a healthy lifestyle by improving their adherence to treatment and help prevent serious complications.

Keywords: Hypertension; treatment adherence, lifestyle change

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INTRODUCTION

Hypertension Disease (HD), is a common chronic condition affecting a significant proportion of the population worldwide (1). Decreased treatment adherence is a barrier to hypertension management and may lead to inadequate control of blood pressure and increased risk of cardiovascular events (2).

The aim of HD treatment is to manage hypertension, to manage all risk factors for cardiovascular disease, glucose intolerance, diabetes, obesity and smoking, and to reduce cardiovascular and renal morbidity and mortality (3). Pharmacologic and nonpharmacologic treatment methods including lifestyle changes should be performed together in treatment (2).

For lifelong prevention of HD, it is important for the individual to acquire healthy lifestyle habits (4). Lifestyle changes such as ideal body weight, dietary salt restriction and healthy eating, cessation of smoking and alcohol use, stress management and physical exercise should be recommended (5). Treatment adherence refers to the extent to which patients comply with the recommendations of health care providers regarding medication use, lifestyle changes and other aspects of their treatment (6). Poor treatment adherence is a major barrier to effective hypertension management and can lead to inadequate control of blood pressure and increased risk of cardiovascular

events (7). HD, with poor adherence to one or more components of counseling have an increased risk of hypertension-related complications due to poor control of their blood pressure (1). The most widely accepted way to assess adherence to treatment is to provide personal feedback (8). By increasing awareness of the importance of treatment adherence, we can help hypertensive individuals achieve better health outcomes and reduce their risk of cardiovascular disease.

The aim of this study was to evaluate treatment adherence and lifestyle change success in relation to patients' demographic characteristics.

MATERIALS AND METHODS

This cross-sectional study was conducted at Giresun Training and Research Hospital between February 15 and March 15. The study was conducted in individuals aged 18 years and older who had been receiving hypertension treatment for at least 6 months at Giresun Training and Research Hospital. Hypertensive individuals who applied to the nephrology outpatient clinic for routine follow-up were randomized into two groups according to gender and age. Hypertensive individuals who could not be contacted or who were on medication for psychiatric conditions and those who refused to participate in the study were excluded.

Hypertensive individuals included in the study group were informed in detail about the purpose and scope of the study and informed consent was obtained from those who agreed to participate in the study. Those who agreed to participate in the study were evaluated using a questionnaire. The questionnaire included questions about sociodemographic characteristics, medical history and the Scale for the Evaluation of Hypertensive Individuals' Adherence to Treatment and Lifestyle Change.

Demographic characteristics

The questionnaire included information on age, gender (male or female), marital status (living alone or living with someone), occupation, social security, level of education (primary, secondary, vocational secondary or higher education), whether living with family or not, and income level.

Information on Disease and its Control

HD, were identified per ICD-10-CM code I.10; Participants were asked about how many years they had hypertension, whether they had any other diseases other than hypertension, optimal blood pressure level, recommended diet and treatments. They were also asked whether they had a blood pressure monitor at home, how often they measured their blood pressure, how many hypertension medications they used, and their concerns when their blood pressure was not under control.

Scale for the Evaluation of Hypertensive Individuals' Compliance with Treatment and Success of Life Changes

It was developed by Esirgen L. in 2018 to assess the compliance of hypertensive individuals with their current treatment and the success of realizing positive lifestyle changes that will support this (9). It is answered in a five-point Likert-type system with 5 sub-dimensions and 18 items. The scale has five sub-dimensions including "compliance with medical treatment", "communication with the physician during the treatment process", "healthy nutrition", "physical activity and weight control", "salt and prepared food consumption". The total points that can be obtained from these sub-dimensions are 6-30 points for compliance with medical treatment, 3-15 points for communication with the physician during the treatment process, 3-15 points for healthy nutrition, 3-15 points for physical activity and weight control, and 3-15 points for salt and prepared food consumption. The total score that can be obtained from the scale is 18-90. The most appropriate cut-off point of the scale was accepted as 68 points with the ROC curve method. Cronbach Alpha coefficient was 0.82. Individuals who score 68 points and above on the scale are considered to be 'compliant' and individuals who score less than 68 points are considered to be 'maladaptive'.

Statistical Analysis

All analyses were evaluated with a threshold of $p<0.050$ for statistical significance and were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM, NY, USA). The Kolmogorov-Smirnov test was used to check normality. The Mann-Whitney U test was used to analyze the comparison of scale scores that were not normally distributed according to binary groups. Spearman's rho correlation coefficients were calculated to examine the relationship between age and scale scores. Analysis results were analyzed as mean±s. deviation and median (minimum - maximum) for quantitative data and as frequency and percentage for categorical data. To confirm the appropriateness of this sample size, the G*Power 3.1 analysis software (G*Power, Düsseldorf, Germany) was used to calculate the minimum number of subjects at the significance level 0.05, median size effect 0.15, and power 0.95, which resulted in 140 useable responses (10).

RESULTS

The study included 140 HD individuals, 70 women and 70 men. The mean age of the individuals was 59.78±11.65, the mean age of women was 60.11±12.48 and the mean age of men was 59.44±10.83. It was found that 87.9% of the participants were married, 29.3% were retired, 58.6% had SSI as their social security, 26.4% were high school graduates, 47.9% lived with their spouses and children, and 43.6% had income equal to their expenses. It was found that 36.4% of the patients had no additional diseases, 67.1% used 1 hypertension medication, 41.4% partially complied with the diet given, and 27.1% were less worried. The mean duration of hypertension was 11.30, the minimum value was 1 and the maximum duration was 40. The mean frequency of blood pressure measurement per week was 5.95, with a minimum frequency of 1 and a maximum frequency of 14 (Table 1).

Table 1. Descriptive statistics for demographic characteristics

		Mean±SD /n	Median (min-max)/%
Age		59.78±11.65	59.50 (32.00 - 88.00)
Gender	Woman	70	50
	Male	70	50
marital status	Married	123	87.9
	Single	14	10
	Divorced	3	2.1
Job	Officer	24	17.1
	Private sector	18	12.9
	Small business	20	14.3
	Unemployed	37	26.4
	Retired	41	29.3
Social security	Sgk	82	58.6
	Individual	41	29.3
	Other	8	5.7
	None	9	6.4
Education	Literate	22	15.7
	Primary school	27	19.3
	secondary school	17	12.1
	High school	37	26.4
	Vocational School	4	2.9
	University/college	32	22.9
	Graduate	1	0.7
with whom he lives	I live alone	16	11.4
	with my wife	45	32.1
	With my wife and kids	67	47.9
	with my children	10	7.1
	with my relatives	2	1.4
Income	Income less than expenses	36	25.7
	Income equals expense	61	43.6
	Income more than expenses	43	30.7
High blood pressure disease duration		11.30±8.63	9.00 (1.00 - 40.00)
blood pressure monitor	Yes	122	87.1
	No	18	12.9
Frequency of measuring blood pressure per week		5.95±4.21	5.00 (1.00 - 14.00)
Additional illness	None	51	36.4
	diabetes mellitus	38	27.1
	Heart diseases	16	11.4
	Diabetes mellitus + heart diseases	13	9.3
	3+ Comorbid Disease	22	15.7
Number of hypertension drugs used	1	94	67.1
	2	31	22.1
	3	15	10.7
Dieting	No	30	21.4
	Yes, I follow my diet exactly	40	28.6
	Yes, I am partial to my diet	58	41.4
	Yes, I do not/cannot follow my diet	12	8.6
Don't worry	None	25	17.9
	Little	38	27.1
	Middle	33	23.6
	A bit more	30	21.4
	quite a lot	14	10

There was no statistical difference between the median Compliance with Medical Treatment score values according to gender (p=0.408). The median value was 17.00 for females and 17.00 for males. The median healthy eating score value was 12.00 for women and 12.00 for men. The median values obtained did not differ according to gender (p=0.598). The median Physical Activity and Weight Control score value was 9.00 for women and 9.00 for men. The median Physical Activity and Weight Control score values obtained do not differ by gender (p=0.242). The median Communication with the Physician in the Treatment Process score value was 13.00 for women and 13.00 for men. The median values obtained do not differ by gender (p=0.188). The median Salt and Prepared Food Consumption score value was 5.00 for women and 6.00 for men. The median values obtained do not differ by gender (p=0.836). The median value of the total score of Treatment Adherence and Life Change Success was 56.00 in women and 58.00 in men. The median Adherence to Treatment and Life Change Success total score values obtained did not differ according to gender (p=0.144) (Table 2).

The Spearman correlation value between age and medical treatment compliance score was statistically significant as r=0.260 (p=0.002). The relationship between age and healthy diet score was statistically insignificant (r=0.016; p=0.853). Statistically, the relationship between age and salt and convenience food consumption score was statistically significant (r=0.294; p<0.001). The relationship between age and physical activity and weight control score was statistically significant (r=0.212; p=0.012). Statistically, the relationship between age and communication with the physician during the treatment process was found to be insignificant (r=0.099; p=0.245). The relationship between age and the total score of treatment adherence and life change success was analyzed by spearman correlation and the relationship obtained was statistically insignificant (r=0.072; p=0.400) (Table 3).

The mean score of compliance with medical treatment was 16.86, the minimum score was 10 and the maximum score was 22. The mean healthy eating score of the patients was 11.62, with a minimum score of 6 and a maximum score of 15. The mean score for physical activity and weight control was 9.09, with a minimum score of 5 and a maximum score of 14. The mean score of the patients' communication with the physician during the treatment process was 12.84, with a minimum score of 8 and a maximum score of 15. The mean score of salt and prepared food consumption of the patients was 5.59, the minimum score was 3 and the maximum score was 11. The mean total score of patients' adherence to treatment and life change success was 55.99, with a minimum score of 40 and a maximum score of 72 (Table 4).

Table 2. Comparison of scale scores by gender

	Woman		Man		Test	p*
	Mean ±SD	Median (Min-Max)	Mean ±SD	Median (Min-Max)		
Medical Treatment Compliance score	16.61±2.37	17.0 (10.0-21.0)	17.11±2.08	17.0 (12.0-22.0)	2253.0	0.408
Healthy eating score	11.54±2.11	12.0 (6.0-15.0)	11.70±2.21	12.0 (6.0-15.0)	2324.5	0.598
Physical Activity and Weight Control score	8.90±1.48	9.0 (5.0-12.0)	9.27±1.87	9.0 (5.0-14.0)	2173.5	0.242
Communication with the Physician score during the Treatment Process	12.60±1.91	13.0 (8.0-15.0)	13.07±1.60	13.0 (10.0-15.0)	2138.5	0.188
Salt and Prepared Food Consumption score	5.53±1.83	5.0 (3.0-11.0)	5.64±1.93	6.0 (3.0-11.0)	2400.5	0.836
Treatment Adherence and Life Change Success total score	55.19±5.50	56.0 (40.0-64.0)	56.80±5.19	58.0 (42.0- 2.0)	2100.0	0.144

Table 3. Examining the relationship between age and scale scores

	Age	
	r	p
Medical Treatment Compliance score	0.260	**0.002**
Healthy eating score	0.016	0.853
Salt and Prepared Food Consumption score	0.294	**<0.001**
Physical Activity and Weight Control score	0.212	**0.012**
Communication with the Physician score during the Treatment Process	0.099	0.245
Treatment Adherence and Life Change Success total score	0.072	0.400

r: Spearman correlation coefficient

Table 4. Descriptive statistics of scale scores

	Average	SD	Hydrangea	Min.	Max.
Medical Treatment Compliance score	16.86	2.23	17.00	10.00	22.00
Healthy eating score	11.62	2.15	12.00	6.00	15.00
Salt and Prepared Food Consumption score	9.09	1.69	9.00	5.00	14.00
Physical Activity and Weight Control score	12.84	1.77	13.00	8.00	15.00
Communication with the Physician score during the Treatment Process	5.59	1.88	6.00	3.00	11.00
Treatment Adherence and Life Change Success total score	55.99	5.39	57.00	40.00	72.00

DISCUSSION

The key to effective antihypertensive treatment is to adhere to pharmacologic and non-pharmacologic recommendations and to ensure appropriate cooperation with the entire medical team (11). In our study, the mean score in terms of compliance with treatment requirements and success of life change was 55.9 out of 68. The score range was 40-72. Higher results showed better compliance and adherence to treatment.

Compliance with treatment has been accepted to correspond to "the degree to which a person's behavior related to taking medication, following a dietary regimen or changing life habits corresponds to the recommendations accepted by a healthcare professional" (12).

The main findings of the study show that patients' compliance with medical treatment and success in life change, especially the factors related to therapy, healthy nutrition and physical activity weight control affect the total compliance score. Understanding the subheadings accompanying nonadherence is useful in managing nonadherence (13). Treatment Compliance and Life Change Achievement total score values did not differ according to gender. Communication with the physician during the treatment process was found to be high. In chronic diseases, long-term treatment adherence is particularly difficult and the risk of treatment discontinuation is very high (12).

In the study, Treatment Adherence and Life Change Success did not differ according to gender. These results are consistent with the study of Paduszyńska et al (14). A significant relationship was found between age and adherence to medical treatment, salt and prepared food consumption, physical activity and weight control. No significant relationship was found between this and the total score of life change success. In studies conducted between patients' compliance to treatment and age, it was found that compliance to treatment decreased with increasing age due

to the use of more than one drug, co-morbidity or decreased cognitive functions (15). Special attention should be paid to the elderly and frail group to ensure treatment compliance.

In the study, patients' adherence to medical treatment was found to be 16.8 according to the Treatment Adherence and Life Change Success Scale (between 6 and 30), which corresponds to a good level of adherence according to our own "cut-off point". Good adherence to medical treatment may be due to good patient-physician communication, with a mean score of 12.8 (between 3 and 15) on the Communication with Physician Scale.

In a cross-sectional study conducted with 500 patients from two institutions in Colombia, The inability to read written information about the management of the disease and to receive information about the benefits of medication prescribed by the doctor has been shown to reduce adherence to treatment (12).

In a study on healthy lifestyle behaviors among Chinese adults, individuals with a history of hypertensive or diabetic or cardiovascular disease were found to be more likely to adhere to all four healthy lifestyle behaviors (16). Bhattacharya et al. In their study, the general level of awareness about optimal salt intake in the diet was found to be very poor (17). In the study, hypertensive individuals were found to have high salt and prepared food consumption and healthy eating scores.

Aerobic exercise is an effective adjunctive treatment to reduce blood pressure in patients with hypertension who use medication (18). In the study, patients' compliance with physical activity and weight control was found to be high.

A meta-analysis of 25 studies involving a total of 10,487 patients shows that education or lifestyle counseling is more successful in blood pressure management (19). For this, it is necessary to participate in professional and multidisciplinary training and to establish a patient and professional structure (20). Increasing treatment adherence among hypertensive individuals requires a multifaceted approach that addresses individual patient needs and preferences. By promoting treatment adherence, healthcare providers can help hypertensive individuals achieve better blood pressure control and reduce their risk of cardiovascular disease.

CONCLUSION

Adherence to treatment is a critical factor in managing HD and reducing the risk of cardiovascular complications. Despite the availability of effective treatments, many hypertensive individuals struggle to adhere to their treatment plans. Poor treatment adherence can be caused by a variety of factors, including medication side effects, forgetfulness and psychosocial factors such as depression and stress. By working with patients, healthcare providers can help improve treatment adherence and hypertension management, leading to better health outcomes and a better quality of life for hypertensive individuals.

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Review Article

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Geriatric Patient Management in the Emergency Department: Challenges and Solutions

Abstract

Today, the increasing geriatric age group means an increase in the need for health services and especially in the rates of application to the emergency room (ER). Management of geriatric patients in the ER is a complicated and peculiar situation due to the frequent debility, inability to express themselves clearly, the presence of complex symptoms and signs, and comorbidity in this patient group. In addition, this further increases the workload of already crowded ERs. It is essential to perform a detailed anamnesis and a comprehensive physical examination in this patient group. However, it can cause the physical examination to be deceptively regular. Therefore, system inspections should be accomplished systematically from head to toe. Even in the slightest hesitation about the diagnosis, using advanced imaging methods should not have hesitation and consultation requests should be more flexible. In addition, the threshold for hospitalization should be kept lower in this age group compared to other age groups.

Keywords: Geriatric age, emergency room, geriatric patient management

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INTRODUCTION

The World Health Organization (WHO) assumes the geriatric age group is 60 years and older, although different age ranges have been described in the literature (1-3). The geriatric age group, which is currently known to be one billion worldwide according to 2019 data, is predicted to grow to two billion in 2050 (1). This increased expectation in the geriatric age group means a raised demand for healthcare services, specifically in admission rates to the Emergency Room (ER) (4). Studies demonstrate that the elder age group constitutes 12% to 24% of ER admissions and that the admission rate will gradually expand as age increases (5–7).

The management of geriatric patients in the ER is exceptional. Depression, inability to describe themselves clearly, the presence of complex symptoms and signs, and comorbidities, which are especially common in this patient group, confuse the work of physicians. This situation also prolongs diagnostic processes, ER stays, and extra costs. These problems improve with age. Indeed, investigations on this subject reveal that the growth in age raises the rates of repeated admissions to the ER, the use of tests in diagnostic processes, the rates of hospitalization, the need for intensive care, and the rates of incorrect discharge and mortality. All the factors mentioned above ultimately boost the workload of the already overcrowded ERs (5).

This article it is aimed to analyze the complications encountered in the management of patients in the geriatric age group who applied to the ER and the solution proposals in the light of the literature.

GENERAL APPROACH TO THE GERIATRIC PATIENT

In this patient group, it is essential to perform a detailed anamnesis and a comprehensive physical examination (2). When gathering patients' history, considering cognitive and functional conditions (such as amnesia, aphasia, and hearing loss), family or caregiver support, if necessary, should be obtained. Past medical problems,

medications used, basal cognitive and functional status, and the main complaint that is the reason for admission to the hospital should be questioned in detail (8).

It should be distinguished whether the patient's complaint is an exacerbation of existing multiple comorbid diseases or a symptom of a new condition (2). Especially in patients using multiple drugs, the medications should be questioned detail regarding complications (delirium, hypotension, weakness, imbalance, incontinence) that may emerge due to drug interactions (9). In this patient class, a decrease in hepatic and renal functions, drug distribution, and excretion will also alter due to the difference in adipose tissue ratios (such as benzodiazepine, phenothiazine, and digoxin) (8).

Especially during the taking anamnesis, the change in the patients' basal cognitive and functional status should be examined. "Functional decline," characterized as a decline in the patient's ability to independently perform activities of daily living, such as bathing, dressing, toileting, and personal care, should be assessed. Thus, it is urged to use Barthel's Activities of Daily Living Scale (ADL) (bathing, dressing, eating, toilet, transfer, personal hygiene, movement in bed, locomotion, and continence are evaluated in four categories as independent, controlled, assisted and dependent) (2,8,10,11). According to this scale, deterioration is generally expected to follow the order of bathing, dressing, toilet, transfer, and feeding. If the first deteriorated activity is nutrition, Organic causes such as sepsis, myocardial infarction, and cerebrovascular disease should be considered (8).

Despite a severe pathology, vital signs may be typical, or significant sign abnormalities detected may indicate a malfunction in a very different system. For instance, tachypnea witnessed in the patient may be caused by cardiac or pulmonary pathologies, or it may be the first sign of an electrolyte imbalance. The typical high fever in the presence of infection may not always be caught in this patient group. Tachycardia may not be observed even in severe hypovolemia due to age-related reductions in heart rate and cardiac output and deterioration in response to catecholamines (7,10). Variations in vital signs can also be noticed in the geriatric age group. Higher threshold values for blood pressure should be used in patients in this age group. A decrease of 30 mmHg or more in the basal value or a decreasing trend should be regarded as an instability criterion (12).

Physical examination in the geriatric age group has some complications in terms of doctors. Despite a severe underlying disease, age-related physiological changes and the variability in response to stress due to the drugs used may cause the physical examination to be deceptively regular (7,10). Therefore, system inspections should be done systematically from head to toe. At this stage, doctors should be alerted to the issues listed below (12,13).

- Possible abuse should be suspected in the presence of unexplained bruises and ecchymosis.
- Care should be taken in terms of pressure ulcers and tissue ischemia.
- Persistent rales on lung auscultation should be interpreted as pathological.
- In the cardiac examination, it should be checked whether there is a pacemaker or not.
- Abdominal examination may be deceptively regular. It should be stated that it is an ordinary condition in that aches cannot be localized and are commonly represented as widespread.

REASONS FOR ADMISSION TO EMERGENCY ROOM IN GERIATRIC PATIENTS

Under this title, typical problems encountered in geriatric patients admitted to ER will be demonstrated.

Cognitive Disorders: Roughly 22-35% of elder patients admitted to the ER have cognitive diseases (2,14). Researchers have reported that one out of every ten admitted to ER and one out of every four hospitalized patients are in delirium. However, they can diagnose only 28-38% of ER physicians at the first admission (15). This situation is essential in emphasizing that geriatric patients admitted to the ER should be routinely evaluated for cognitive dysfunction (14). The most common ailments are delirium, dementia, and psychiatric disorders (2). Although cognitive functions are affected in all three cases, their clinical presentations vary (Table 1) (16).

Table 1. Characteristics of delirium, dementia, and psychiatric disorders (16).

CHARACTERISTIC	DELIRIUM	DEMENTIA	PSYCHIATRIC DISORDERS
Beginning	Within days	Sly	Moment
24-hour clinical course	Wavy	Stable	Stable
Consciousness	Decreased/ increased level of alertness	Awake	Awake
Attentieon	Degraded	Normal	It may be corrupted
Cognitive function	Irregular	Degraded	It may be corrupted
Orientation	Degraded	Often corrupted	It may be corrupted
Hallucinations	Visual and/or audio	Not often	Usually auditory
Delusions	Temporary, poorly organized	Usually not	Continually
Movements	May be asterixis and tremor	Not often found	Not found

Delirium is an organic condition with fluctuations in attention, sleep-wake, and mental status (2). The most typical feature is deterioration in cognitive functions. It should be kept in mind that there is an underlying organic cause in 95% of patients diagnosed with delirium, and the underlying cause should be investigated until proven otherwise. It should also be noted that the mortality rate in patients who develop delirium is higher than in those who do not (9). Primary neurological diseases, infections, metabolic or electrolyte disorders, and drug side effects are the most common causes of acute changes in mental status (17) (Table 2).

Table 2. Conditions that trigger delirium (2)

Systemic diseases	Primary brain diseases	Medicines	Environmental/ iatrogenic factors
Infection/sepsis	Stroke	Multidrug	Long ER stay
dehydration	Meningitis	Opioids	Insomnia
Hypoxia/ Hypercarbia	Encephalitis	Anticholinergic drugs	Surgical interventions
Shock	Epileptic seizure	Sedative-hypnotics	Permanent urinary catheter
Electrolyte disorder	Epidural bleeding	Substance or alcohol use	Pain
Hypo/ hyperglycemia	Intracerebral hemorrhage	Alcohol or sedative drug withdrawal	Physical limitation
Hypo/ hyperthermia	Subdural bleeding		
Trauma			
Acute Coronary Syndromes			

Unlike delirium, dementia has a prolonged commencement and progression over time. There may be occasional fluxes in manifestation. However, the person's consciousness, attention, and orientation are preserved (14,16).

The points to be considered in patients presenting with cognitive disorders are as follows (2,14, 16):

- It is necessary to take a detailed anamnesis from the primary caregiver.
- It is a common mistake to think that the change in consciousness is primarily a result of old age.
- Simple and time-consuming tests should be used.
- The goal of diagnosis and treatment should be to find and correct the underlying cause.
- The grief reaction may also develop due to psychosocial factors such as environmental differences.
- In the first place, vital conditions such as hypoxia and hypoglycemia that can be treated urgently should be excluded.
- Selection of laboratory and imaging methods should be made according to the patient's medical history, existing diseases, and physical examination.
- The patient should be hospitalized when there is no smoothly reversible cause in the etiology or it is not discovered. In other cases, the discharge decision should be made according to patient characteristics, safety, and hospital facilities.

Falls: Falls are the most common cause of trauma-related admissions, especially over 65 (8,12). Falls are widespread in the geriatric age group due to balance and walking difficulties. Common reasons for falls in the elderly are displayed in Table 3.

Points to be considered in geriatric patients presenting with a fall (2,8,12):

- Severe injuries resulting in fractures occur in 50% of falls.
- The falling ground and height affect the type and severity of the trauma.
- High-energy trauma poses a greater risk of head and spine injuries.
- The most common type of fracture after falling is hip fracture.
- A fall may also be a symptom of a severe or acute illness (such as pneumonia, sepsis, or embolism). The primary disease should not go unrecognized, and the differential diagnosis range should be broad.
- Attention should be paid to dehydration and rhabdomyolysis in patients who have not received help for a long time after falling.

Table 3. Conditions that trigger delirium (2)

Systemic diseases	Primary brain diseases	Medicines	Environmental/ iatrogenic factors
Infection/sepsis	Stroke	Multidrug	Long ER stay
dehydration	Meningitis	Opioids	Insomnia
Hypoxia/ Hypercarbia	Encephalitis	Anticholinergic drugs	Surgical interventions
Shock	Epileptic seizure	Sedative-hypnotics	Permanent urinary catheter
Electrolyte disorder	Epidural bleeding	Substance or alcohol use	Pain
Hypo/ hyperglycemia	Intracerebral hemorrhage	Alcohol or sedative drug withdrawal	Physical limitation
Hypo/ hyperthermia	Subdural bleeding		
Trauma			
Acute Coronary Syndromes			

Coronary Artery Disease: Age is a risk factor for coronary artery disease (18). In the literature on this subject, more than 60% of unstable chest pain cases admitted to ER are 65 years and older, 30% of patients with acute myocardial infarction are 75 years and older, and the mortality associated with coronary artery disease in the geriatric age group is 60 years and above it is seen that there is a severe growth in information (19,20). Points to be considered in this patient group (18,21,22):

- Chest pain is one of the primary complaints of this age group applied to ER.
- More than 50% of elderly patients diagnosed with acute coronary artery disease present with atypical complaints (nausea, vomiting, syncope).
- Parameters accepted as classical risk factors for coronary artery disease (such as hypertension, diabetes mellitus, smoking, and family history) are not very significant for the geriatric patient group.
- Electrocardiography taken at the first admission is 43% non-diagnostic and should be compared with the patient's previous electrocardiograms, if possible.

Abdominal pain: In abdominal pain seen in patients in the geriatric age group, both symptoms and examination findings are faint. This circumstance affects diagnostic accuracy in old patients. Publications report that the diagnostic accuracy in these patients varies between 40-80% (22,23). It has also been noted that mortality rates are 6-8 times higher, and the need for surgery is twice as high in geriatric patients compared to younger patients (23). Another great point in the geriatric patient group presenting with abdominal pain is that there is a significant difference between the preliminary and final diagnoses. Because abdominal pain has a wide range of differential diagnoses and, as mentioned earlier, the anamnesis and physical examination are obscure in geriatric patients. In addition, considering the high rate of recurrent admissions after discharge, it can be efficiently seen that managing patients with abdominal pain is a troublesome condition for ER physicians (24). The points to be considered in these patients are as follows (13,24):

- Symptoms are unclear, mild, atypical, and not definable.
- Surgical complications are more common since the application is usually late.
- Despite the presence of severe infection, fever may not be present. Patients may even be hypothermic.
- Clinical suspicion and a personalized approach are fundamental in this patient group, as the causes of abdominal pain change significantly with increasing age.
- While gastroenteritis is rare in elderly patients, it should be kept in mind that diarrhea may be the patient's complaint in Acute Mesenteric Ischemia, which is one of the causes of mortal acute abdominal pain.
- In addition to pain localization, accompanying symptoms can also guide the differential diagnosis (Table 4).
- The white blood cell has a low predictive value in this age group.
- If there are no contraindications for patients' pain during the diagnostic process, opioid analgesics can alleviate their pain.
- If needed, ondansetron (4-8mg IV, maximum 0.45mg/kg/day), IV 10 mg Metoclopramide (slow infusion for extrapyramidal side effects) can be given.
- Although imaging selection is recommended according to pain localization similar to that in the general population, it should be noted that the sensitivity and specificity of contrast-enhanced abdominal computed tomography are higher in this age group.
- Even without indecision about the diagnosis, using advanced imaging methods should not hesitate.
- The threshold values of the criteria for observation and hospitalization should be kept lower in this patient group.

Table 4. Classification of known abdominal diseases according to symptoms (13)

Pain/ vomiting(±rigidity)	Pain/vomiting/ distention	Pain (±vomiting)
Acute pancreatitis Diabetic gastric paresis Diabetic ketoacidosis Incarcerated hernia	Intestinal obstruction Cecal volvulus	Acute diverticulitis Adnexal torsion Mesenteric ischemia Myocardial ischemia* Testicular torsion
Pain/shock	**Pain/shock/rigidity**	**Distention(±pain)**
Abdominal sepsis Aortic dissection hemorrhagic pancreatitis Abdominal aortic aneurysm rupture Acute Mesenteric Ischemia (late stage) Myocardial ischemia?* Ectopic pregnancy rupture	Appendix perforation Diverticulum perforation Ulcer perforation Esophageal rupture Spleen rupture	BIntestinal obstruction/ volvulus

Note: These symptom and etiologic groups are a guideline and are not intended as a rule.
*The symptoms of myocardial ischemia are variable.

Infections: Infections constitute 4-7% of the causes of ER admission and are responsible for one-third of deaths (2,25). Pneumonia (25%), urinary tract infection (22%), sepsis, and bacteremia (18%) are the most common infections (22). In the geriatric age group, the susceptibility to infection and the rates of infection-related mortality increase due to changes in the

immune system, especially with age, and many different factors. Points to be considered in this age group (22,24):

- They usually present to ER with atypical symptoms such as delirium, falling, and palpitations.
- Absence of classic symptoms such as fever does not exclude infection.
- In addition, laboratory support is low in this patient group.
- Holistic evaluation such as history, physical examination, imaging, and laboratory tests is essential, and imaging methods contribute the most to the emergency physician in the differential diagnosis.

Trauma: Although the geriatric age group covers less than 20% of trauma patients, it is noteworthy that it has a rate of 28% in trauma-related mortality. In addition, the prolongation of hospital stay, functional losses, and the fact that trauma prevents independent living make traumas in this age group special. Matters needing attention (10,12,26):

- The quality and speed of the intervention are decisive in terms of morbidity and mortality.
- Metabolic and endocrine response to trauma is decreased.
- Vital parameters should be monitored early and followed closely, as elderly patients can deteriorate rapidly without any predisposing symptoms.
- In the anamnesis, the use of drugs that affect coagulation should be questioned as it is directly related to the risk of adverse consequences related to trauma.
- Attributing changes in the patient's mental state primarily to the patient's dementia can have fatal consequences.
- The risk of subdural and intraparenchymal hemorrhage in these patients is higher than in other age groups.
- Osteoporosis increases the incidence of cervical spine injury twice as much as in other age groups.
- Mortality, morbidity, and complication rates due to rib fractures are higher than in other age groups.
- Abdominal examination is unreliable: Especially in patients with lower rib and pelvis fractures, even if the abdominal examination is regular, suspicion of intra-abdominal injury should remain.
- Pelvic fracture can be seen even in low-energy traumas such as falling on a flat surface or sitting position. Computed tomography should be requested even if the X-ray harms every elderly patient with pelvic sensitivity, and magnetic resonance imaging should be requested when the CT is negative.
- More flexibility should be applied in diagnostic imaging requests in this age group.
- The increased risk of contrast nephropathy can be reduced by volume augmentation with isotonic crystalloid.
- In traumas of this age group, the hospitalization threshold should be kept lower regardless of trauma severity.

Frailty: Frailty is a crucial geriatric problem defined as an increased sensitivity to adverse health outcomes due to decreased physiological reserves and system functions with age. It can be summarized as vulnerability to physical, cognitive, psychological, social, and environmental factors (27).

The fragility is associated with poor outcomes such as falling, dependence on others, hospitalization, recurrent hospital admissions, and mortality (28,29). For this reason, the risk group needs to be identified early with comprehensive evaluations and for the timely implementation of protective actions. Patients; can also give an idea about the need for hospitalization, addiction, and mortality (2,28). Although the gold standard is a descriptive test, the Clinical Vulnerability Scale (CFS) is a method that can be used in ERs in terms of practicality and sensitivity (Table 5).

Table 5. Clinical Frailty Scale (28)

1-Very fit	Vigorous, active, energetic, exercises regularly, is in the fittest group for its age.
2-Fit	No active disease, less than category 1 fit
3-Chronic disease under control, in good condition	According to category 4, chronic disease symptoms are under control
4-Prone to brittleness	He complains of symptoms of illness or slows down his movements, although he has no obvious addiction.
5-Slight fragility	Limited dependence on instrumental daily life activities
6-Moderate fragility	Need for assistance in instrumental and non-instrumental activities of daily living
7-Serious fragility	Terminal illness or total dependence on activities of daily living

CONCLUSION

Complex and intertwined acute medical conditions, such as atypical presentations, unspecific symptoms, comorbidity, and multiple drug use, which are frequently encountered in the geriatric age group in the emergency department, complicate the work of physicians. However, despite all these, a combined approach consisting of a detailed anamnesis and targeted examinations in addition to the physical examination will facilitate the work of physicians in the diagnosis and treatment processes.

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