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The journal aims to publish scientifically high quality articles which can contribute to the literature and written in the emergency medicine field and other related fields. Review articles, case reports, editorial comments, letters to the editor, scientific letters, education articles, original images and articles on history and publication ethics which can contribute to readers and medical education are also published.

The journal's target audience includes Emergency Medicine experts, School members who conduct scientific studies and work in the Emergency Medicine field, researchers, experts, assistants, practicing physicians and other health sector professionals.

Editorial and publication processes of the journal are shaped in accordance with the guidelines of the international organizations such as the International Council of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the Council of Science Editors (CSE), the Committee on Publication Ethics (COPE), the European Association of Science Editors (EASE). The journal is in conformity with Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

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Editorial and publication processes of the journal are shaped in accordance with the guidelines of the international organizations such as the International Council of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the Council of Science Editors (CSE), the Committee on Publication Ethics (COPE), the European Association of Science Editors (EASE). The journal is in conformity with Principles of Transparency and Best Practice in Scholarly Publishing (doaj.org/bestpractice).

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Manuscript Types

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Tables

Tables should be included in the main document, presented after the reference list and they should be numbered consecutively in the order they are referred to within the main text. A descriptive title must be placed above the tables. Abbreviations used in the tables should be defined below the tables by footnotes (even if they are defined within the main text). Tables should be created using the "insert table" command of the word processing software and they should be arranged clearly to provide an easy reading. Data presented in the tables should not be a repetition of the data presented within the main text but should be supporting the main text.

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Type of manuscript	Word limit	Abstract word limit	Reference limit	Table limit	Figure limit
Original Article	5000 (Structured)	200	50	6	7 or total of 15 images
Review Article	5000	200	50	6	10 or total of 20 images
Case Report	1500	200	10	No tables	10 or total of 20 images
Letter to the Editor	500	N/A	5	No tables	No media
Scientific letter	900	N/A	10	No tables	2 or total of 4 images
Clinical Imaging/ Visual Diagnosis	400	N/A	5	No tables	3 or total of 6 images
History	900	N/A	10	No tables	3 or total of 6 images
Publication ethics	900	N/A	10	No tables	No media

Figures and Figure Legends
Figures, graphics and photographs should be submitted as separate files (in TIFF or JPEG format) through the submission system. The files should not be embedded in a Word document or the main document. When there are figure subunits, the subunits should not be merged to form a single image. Each subunit should be submitted separately through the submission system. Images should not be labelled (a, b, c, etc.) to indicate figure subunits. Thick and thin arrows, arrowheads, stars, asterisks and similar marks can be used on the images to support figure legends. Like the rest of the submission, the figures too should be blind. Any information within the images that may indicate an individual or institution should be blinded. The minimum resolution of each submitted figure should be 300DPI. To prevent delays in the evaluation process all submitted figures should be clear in resolution and large in size (minimum dimensions 100x100 mm). Figure legends should be listed at the end of the main document.

All acronyms and abbreviations used in the manuscript should be defined at first use, both in the abstract and the main text. The abbreviation should be provided in parenthesis following the definition.

When a drug, product, hardware, or software mentioned within the main text product information, including the name of the product, producer of the product, city of the company and the country of the company should be provided in parenthesis in the following format: "Discovery St PET/CT scanner (General Electric, Milwaukee, WI, USA)"

All references, tables and figures should be referred to within the main text and they should be numbered consecutively in the order they are referred to within the main text.

Limitations, drawbacks and shortcomings of original articles should be mentioned in the "Discussion" section before the conclusion paragraph.

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Book Section: Sherry S. Detection of thrombi. In: Strauss HE, Pitt B, James AE, editors. Cardiovascular Medicine. St Louis: Mosby; 1974.p.273-85.

Books with Single Author: Cohn PF. Silent myocardial ischemia and infarction. 3rd ed. New York: Marcel Dekker; 1993.

Editor(s) as author: Norman IJ, Redfern SJ, editors. Mental health care for elderly people. New York: Churchill Livingstone; 1996.

Conference Proceedings: Bengisson S. Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992.p.1561-5.

Scientific or Technical Report: Smith P. Golladay K. Payment for durable medical equipment billed during skilled nursing facility stays. Final report. Dallas (TX) Dept. of Health and Human Services (US). Office of Evaluation and Inspections: 1994 Oct. Report No: HHSIGOE 169200860.

Thesis: Kaplan SI. Post-hospital home health care: the elderly access and utilization (dissertation). St. Louis (MO): Washington Univ. 1995.

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Epub ahead of print Articles: Sarıtaş A, Güneş H, Kandiş H, Çıkman M, Çandar M, Korkut S, et al. A Retrospective Analysis of Patients Admitted to our Clinic with Aortic Dissection. Eurasian J Emerg Med 2011 Dec 10. doi: 10.5152/jaem.2011.035. [Epub ahead of print]

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CONTENTS

Original Articles

Case Reports

EURASIAN JOURNAL OF EMERGENCY MEDICINE

Association of Severity of Coronary Lesion with Markers of Acute Infection and Inflammation in Patients with Acute Coronary Syndrome

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Abstract

Aim: Inflammation and some infectious agents play a key role in acute coronary syndrome (ACS) caused by atherosclerosis. The purpose of this study was to assess the effects of inflammatory markers and the positivity of Chlamydia pneumoniae (CP), Helicobacter pylori (HP), and Cytomegalovirus (CMV) on the level of atherosclerosis in patients with ACS.

Materials and Methods: Patients (57) that were referred to the emergency unit with classic angina symptoms or angina equivalent symptoms and were determined to have critical lesions in the coronary angiography (>70% stenosis, coronary artery disease (CAD) severity assessed by the Gensini score) were compared with 27 ACS patients who had no critical lesions in terms of procalcitonin (PCT), tumor necrosis factor-alpha (TNF-α), interleukin-2 receptor (IL-2r), interleukin-6 (IL-6), and interleukin-10 (IL-10) levels and positivity of CP, HP, and CMV. Also, the two groups of ACS patients were compared in terms of cytokine levels measured at hours 0 and 48.

Results: No significant association was found between the degree of the coronary lesion and the inflammatory and infectious agents. However, in patients with critical coronary lesions, as markers of inflammatory agents, the levels of IL-6 were significantly lower and levels of IL-10 were significantly higher ($p<0.001$ and $p=0.030$, respectively) at hour 48 than originally found at hour 0.

Conclusion: There is no association between the severity of coronary lesions and cytokine levels and positivity of infectious agents in ACS since the levels of proinflammatory cytokines in ACS are higher than those in atherosclerosis. The changes in cytokine levels at hour 48 were found to be significant.

Keywords: Coronary lesion, biomarkers, infection, inflammation, acute coronary syndrome

Introduction

Inflammation plays a key role in atherosclerosis, which leads to acute coronary syndrome (ACS) (1-3). The pro-inflammatory markers interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) along with anti-inflammatory marker interleukin-10 (IL-10) are described as part of the inflammatory process in atherosclerosis (4). IL-2 and interleukin-2 receptor (IL-2R), which is expressed on the surface of lymphocytes, have key roles in the beginning of inflammation via their direct effects on T cells (5). Various studies have shown that the diffuseness of atherosclerosis and then the probability of coronary artery disease (CAD) can be predicted by studying the levels of inflammatory markers in healthy individuals (6, 7).

A series of studies have reported that infectious agents of low virulence, such as *Chlamydia pneumoniae* (CP), *Helicobacter pylori* (HP), and *Cytomegalovirus* (CMV), may play a role in the pathogenesis of atherosclerosis by affecting the coronary artery walls. These studies have claimed that these agents may directly induce inflammation in the arterial walls by mechanisms such as innate immunity, molecular imitation, and autoimmunity (8-11).

The purpose of this prospective study was to assess the association of inflammatory markers and the positivity of CP, HP, and CMV with the severity of atherosclerosis in patients with ACS.

The study was presented partially on 1st International Emergency Medicine Symposium, 13-15 April 2012, Baku, Azerbaijan.

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Materials and Methods

Study population

The study included patients referring with angina symptoms and angina equivalent symptoms to the emergency department of a university hospital in the 6 month period between July 2011 and January 2012. The patients who had clinical, electrocardiographic (ECG) (concordant ST elevation >1 mm in leads with a positive QRS complex, concordant ST depression >1 mm in V1-V3, excessively discordant ST elevation >5 mm in leads with a negative QRS complex; Sgarbossa criteria), and echocardiographic (ECHO) findings (wall motion disorder), changes in cardiac markers, and critical lesions determined by coronary angiography comprised the test group; and patients with no critical lesions found in coronary angiography comprised the control group.

Exclusion criteria

The cases with the following disorders, which might affect the obtained data (related to the infection and inflammation process), were excluded from the study: chronic renal insufficiency, hepatic insufficiency, advanced cardiac failure, respiratory insufficiency, rheumatic disease, sepsis, and cancer or undergoing cancer therapy.

Study protocol

The following features of the patients were noted: age, sex, pulse rate, respiratory rate, average blood pressure, body temperature, history of alcohol consumption and smoking, hyperlipidemia (HL), diabetes mellitus (DM), hypertension (HT); presence of CAD, cerebrovascular event (CVE) or coronary artery bypass graft operation (CABGO) surgery in the anamnesis; and presence of unstable angina pectoris (USAP) or acute myocardial infarction (AMI) at the time of referral. At the time of patients' referral to the emergency unit, the following were tested and their levels were noted: white blood cells (WBC), creatine-kinase-MB fraction (CK-MB), troponin-I (TnI), procalcitonin (PCT), TNF-α, IL-2R, IL-6, IL-10, triglyceride (TG), cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), international normalized ratio (INR), activated partial thromboplastin time (aPTT), CMV, HP, and CP. Likewise, after 48 hours, the following were tested and their levels were noted: WBC, CK-MB, troponin-I, TNF-α, IL-2R, IL-6, and IL-10.

The criteria for HT was a blood pressure over 140/90 mm Hg after resting for at least 10 minutes or the presence of HT or history of antihypertensive agent use; for DM, fasting blood glucose level over 126 mg/dL or use of antidiabetic agents; and for HL, lipoprotein level over 130 mg/dL or TG level over 200 mg/dL or use of hypolipidemic agents.

Venous blood specimens of 10 cc were taken from each patient at the time of referral and also after 48 hours. Complete blood count and cardiac marker tests were performed immediately after samples were taken; blood specimens to be tested for inflammatory markers were centrifuged and then kept at −80°C until the time of testing. All patients included in the study were informed about the investigation, and their consents were obtained. The study was begun after obtaining approval from the local ethics committee of Meram Medical Faculty (approval date and no: 24.02.2011 - 056).

Angiographic assessment of coronary artery disease severity

The anatomic severity was determined with a high-quality cineangiogram. The severity of the lesions in the arteries was measured and noted. A critical lesion was defined as 70% stenosis in at least one artery. The number of lesions and severity and anatomic localization of the obstruction were assessed by the Gensini score (12). The angiographic examinations of the patients were performed by cardiologists who did not take part in the study.

Markers of inflammation

The inflammatory and cytokine profiles of the patients were determined by laboratory staff who did not know of the patients' angiograms. The presence of CMV-DNA (Artus™, GmbH, Hamburg, Germany), HP-DNA (Artus™, GmbH, Hamburg, Germany), and CP-DNA (Artus™, GmbH, Hamburg, Germany) in the sera of both the test and control patients were assessed using the real-time polymerase chain reaction (PCR) method. The DNA material in the sera was extracted with an automated DNA extraction device (EZ1 Advanced-XL™, Qiagen Instruments, Hombrechitkon, Switzerland) using DNA extraction kits for *C. pneumoniae* and *H. pylori* (EZ1™ Bacteria Mini Kit V2.0, Qiagen GmbH, Hilden, Germany) and for CMV (EZ1™ Virus Mini Kit V2.0, Qiagen GmbH, Hilden, Germany). The DNAs were determined with real-time PCR using a Rotor-Gene Q™ cycler (Qiagen, Hilden, Germany).

The assays for IL-2, IL-6, IL-10, and TNF-α (Seimens Healthcare Diagnostics Products Ltd., Lianberis, Gwynedd, UK) levels were carried out with the chemiluminescence method (Immulite1000™ Immunoassay System, Siemens Healthcare Diagnostics Ltd., NJ, USA). The procalcitonin assays (Procalcitonin, Siemens Healthcare Diagnostics Inc., Tarrytown, NY, USA) were also performed with the chemiluminescence method (AdviaCentaur XP™ immunoassay System, Siemens Healthcare Diagnostics Inc., Tarrytown, NY, USA).

Statistical analysis

For statistical analysis, the Statistical Package for the Social Sciences™ version 15.0 (SPSS Inc.; Chicago, IL, USA) software package was used. The quantitative variables were expressed as mean ± standard deviation and categoric variables as number of cases (%). All data were subjected to normality analysis. For the comparison of the test group with the control group, quantitative variables with normal distribution were compared with a Student's t-test and quantitative variables with non-normal distribution with a Mann-Whitney U test. The categoric variables of the two groups were compared with the chi-square test and Fisher's exact test. The patients' variables dependent on the change of markers with time were evaluated with t-tests (paired samples t-test).

Results

The study included 57 test and 27 control patients, a total of 84 patients. Of the test and control patients, 46 (80.7%) and 11 (40.7%) were males, respectively. Male patients were significantly higher in the test group (p=0.006). The respective mean ages of the test and control groups were 64.67±11.63 and 61.04±13.44 and there was no significant difference (p=0.208). The demographic data of the test and control groups and the vital findings determined on referral are shown in Table 1. The rates of the presence of DM and HL and past CABGO were significantly higher in the test group than in the control group (p=0.012, p=0.006, and p=0.020, respectively).

The diagnostic distribution of all patients included in the study is shown in Table 2. The angiographic examination of the 84 patients showed the presence of stenosis varying between 20% and 70% in

Table 1. Demographic data and vital findings were compared in the test and control groups

	Control (n:27)	Test (n:57)	p
Age (y)	61.04±13.44	64.67±11.63	0.208
Sex M/F (n)	14/13	46/11	0.006*
Demographic Data			
CAD (%)	25.9	35.1	0.401
DM (%)	3.7	31.6	0.012*
HT (%)	40.7	59.6	0.105
HL (%)	3.7	29.8	0.006*
Smoke (%)	40.7	43.9	0.787
Alcohol (%)	0	1.8	0.489
Surgery (%)	0	17.5	0.020*
CVE (%)	0	5.3	0.225
mAP (mm/Hg)	84.93±11.56	96.30±18.36	0.040*
Pulse (beats/min)	77.93±17.37	80.09±19.58	0.626
Fever (C°)	36.70±0.24	36.62±0.17	0.828
Respiratory rate (respiratory/min)	14.19±1.38	15.44±3.95	0.114

CAD: coronary artery disease; DM: diabetes mellitus; HT: hypertension; HL: hyperlipidemia, CVE: cerebrovascular event, mAP: mean arterial pressure
*p<0.05

Table 2. Diagnostic distribution of the test and control groups, and coronary lesion severity distribution according to the coronary angiographic evaluation

	n:84
Diagnosis	
-USAP (control)	27
-USAP (test group)	6
-NSTEMI	16
-STEMI	35
Vessel Lesions < % 70	27
Vessel Lesions > % 70	
-single vessel	25
-two vessels	17
-three vessels	15

USAP: unstable angina pectoris; NSTEMI: non ST elevation myocard infarction; STEMI: ST elevation myocard infarction

the 27 cases that were not accepted as critical. The distribution of artery pathologies in the 57 patients that were found to have critical lesions in the angiography is also shown in Table 2.

The results of the biochemical and inflammatory markers of the test and control groups measured at the time of referral to the emergency department are shown in Table 3. The CK-MB and Tn-I levels were statistically higher in the test group than those in the control group (p<0.001 and p=0.001, respectively). There was no significant difference between the test group and control group in terms of WBC and PCT values and lipid profile.

Table 3. Markers of cardiac, inflammatory, and infection were compared in the test and control groups

	Reference Values	Control (n:27)	Test (n:57)	p
WBC (×10^9/L)	4-10	8.15±2.78	12.79±12.28	0.067
CK-MB (ng/mL)	<5.5	2.00±1.52	52.20±88.25	<0.001*
Tn-I (ng/mL)	<0.04	0.04±0.05	13.27±27.34	0.001*
PCT (ng/mL)	<0.1	0.10±0.09	0.10±0.10	0.974
TNF-α (pg/mL)	<8.1	1.92±9.13	3.23±9.98	0.676
IL-2r (IU/mL)	158-623	919±1711	704±549	0.523
IL-6 (pg/mL)	3.4-5.9	9117±16707	12847±18514	0.409
IL-10 (pg/mL)	1.5-9.1	61.08±154.45	25.59±7.66	0.239
TG (nmol/L)	35-160	185.88±160.92	161.60±138.32	0.490
Cholesterol (nmol/L)	140-200	183.88±52.41	177.98±47.10	0.617
LDL (nmol/L)	60-130	111.84±33.85	109.14±34.09	0.743
HDL (nmol/L)	30-80	35.84±12.20	35.57±9.12	0.913
INR	0.8-1.2	1.09±0.08	1.15±0.23	0.466
APTT (s)	23-35	25.48±4.51	29.47±5.98	0.138
CMV (%)		7.4	8.7	0.530
HP (%)		11.1	10.5	0.642
CP (%)		3.7	3.5	0.704

WBC: white blood cell; CK-MB: creatine-kinase-MB fraction; TnI: troponin I; PCT: procalcitonin; TNF-α: Tumor necrosis factor-α; IL-2r: interleukin-2 receptor; IL-6: interleukin-6; IL-10: interleukin-10; TG: triglyceride; LDL: low density lipoprotein; HDL: high density lipoprotein; INR: international normalized ratio; APTT: activated partial thromboplastin time; CMV: cytomegalovirus; HP: helicobacter pylori; CP: chlamydia pneumoniae
*p<0.05

Table 4. Comparison of inflammatory and cardiac markers of the patient group on referral to the emergency department and after 48 hours

	initial values	48 hours later values	p
IL-6 (pg/mL)	12847±18514	61±198	<0.001*
TNF-α (pg/mL)	3.23±9.98	4.29±13.88	0.667
IL-2r (IU/mL)	704±549	792±704	0.361
IL-10 (pg/mL)	25.59±7.66	32.72±15.02	0.030*
WBC (×10^9/L)	12.79±12.28	11.9±3.63	0.740
CK-MB (ng/mL)	52.20±88.25	14.17±16.19	0.041*
Tn-I (ng/mL)	13.27±27.34	21.31±22.41	0.047*

IL-6: interleukin-6; TNF-α: tumor necrosis factor-α; IL-2r: interleukin-2 receptor; IL-10: interleukin-10; WBC: white blood cell; CK-MB: creatine-kinase-MB fraction; TnI: troponin I
*p<0.05

When the two groups were compared, no statistically significant correlation was found between the levels of inflammatory markers IL-6, TNF-α and IL-2R and the level of anti-inflammatory marker IL-10.

Also, there was no statistically significant difference between the two groups in terms of serological positivity of CMV, HP, and CP.

Comparison of inflammatory and cardiac markers of the patient group on referral to the emergency department and 48 hours later are shown in Table 4. In the patient group, the IL-6 levels measured at hour 48 were statistically lower than those measured at the time of referral, whereas the levels of IL-10 were found statistically higher ($p<0.001$ and $p=0.030$, respectively). There was no statistically significant change in the levels of IL-2R and TNF-α in terms of initial and hour 48 measurements.

Discussion

It has been shown that various inflammatory markers used to determine cardiovascular risk are useful in the classification of risks, and can also be used in the determination of patients to benefit from interventional therapy (13). Moreover, it has been found that the significant rise in the levels of inflammatory markers in ACS helps in prediction of future cardiovascular risk (14). For instance, it has been claimed that monocyte procoagulant activity stimulated by IL-6 can cause an association between inflammation and thrombosis in patients with CAD (15). But in our study, we did not find such an association when we assessed the infection seropositivity and acute inflammatory response in the acute stages in patients referring with suspected ACS. Also, we found no significant difference between patients with critical artery lesions and patients with no critical artery lesions in terms of inflammatory cytokine levels (IL-2R, IL-6, IL-10, and TNF-α).

Sukhija et al. (16), in their study of 249 ACS patients referring with chest pain and undergoing angiography, found no significant differences between the levels of IL-6 and TNF-α and the severity of atherosclerosis.

Gotsman et al. (4), in their study of 119 patients undergoing angiography in a consecutive order, determined a significant association between the markers IL-6 and TNF-α and the severity of CAD. They observed that, with increasing severity of the arterial lesion, the levels of IL-6 and TNF-α show a significant rise. The authors determined a strong association between high cytokine levels and the degree of atherosclerosis in the subgroup of patients with a stabile coronary; but in the ACS subgroup, a weak association between TNF-α and atherosclerosis was found with no association between IL-6 and atherosclerosis. This situation is caused by the rise in proinflammatory cytokine levels during acute coronary events, which leads to the rise in cytokine levels; and for this reason, an association between cytokine levels and severity of CAD cannot be established (4).

Heinisch et al. (17) compared 20 ACS patients (AMI and USAP) with 20 stabile angina pectoris (SAP) patients in terms of IL-6 and TNF-α levels and determined a significant rise in IL-6 and TNF-α levels in the ACS group. Although they observed the IL-6 levels in ACS patients to be indeterminable after 15 to 30 days, they found a significant rise in the TNF-α levels of ACS patients after 30 days (17). When this situation was interpreted in light of former studies (7), it was claimed that TNF-α levels rise in the months following AMI and this rise increases the risk of coronary event recurrances (17).

In their study, Sakamoto et al. (18) divided 286 patients angiographically assessed into two groups based on arterial lesions as the CAD group and a healthy control group. They found significantly higher levels of IL-2R in the CAD group than in the control group. Nijm et al. (19) compared a total of 65 CAD patients, which included 20 patients diagnosed with ACS upon their referral and 45 patients of SAP determined to have significant stenosis in the angiography performed at the time of referral, with 45 healthy controls in terms of IL-2R and IL-10 levels and found no significant difference between the two groups. Hu and Hwang (20), in their study of AMI, USAP, SAP, and control groups (20 subjects in each), found significantly high levels of IL-6 and IL-10 only in the AMI group when compared with the control group. They determined no significant difference in TNF-α levels between AMI, USAP, and SAP groups, but significant levels of TNF-α in all these groups when compared with the control group. After one week, they found a significant decrease in IL-6 levels in the AMI group, but no changes in the levels of IL-10 and TNF-α (20). In our study, after 48 hours, we found a statistically significant decrease in IL-6 and significant increase IL-10 levels, but an insignificant increase in TNF-α level. In the literature, heterogeneity among the compared groups, the difference in test repetition times, small study populations, the fact that they are single-centered studies, and inconsistency between the results obtained are insufficient to make concrete claims in this respect. Whenever possible, there is a need for multicentered studies with large populations among homogenous groups.

The non-specific and non-infectious stimulation of PCT is far lower when compared with the other markers of inflammatory response. In local and systemic inflammation, successive monocytic activation is a prerequisite for PCT production (21-24). PCT serves as a chemo-attractant. Primarily, it is produced in coherent monocytes, but for more production, in the case of inflammation, it is produced by parenchymal cells in the inflammatory tissues. Peripheral blood mononuclear cells express PCT both on mRNA and protein levels. Lipopolysaccharides and various proinflammatory cytokines, such as IL-1β, IL-2, IL-6 and TNF-α, directly play an important role and indirectly have pronounced stimulatory effects on the expression of PCT mRNA (24-27). In our study, we found no significant association between PCT levels and the severity of ACS. Likewise, Sinning et al. (28) reported a significant difference in PCT between patients with AMI and USAP and patients with SAP, but no such difference between AMI and USAP.

In our study, we assessed the test group and control group in terms of HP, CMV, and CP antibodies, but found no difference between the two groups. Likewise, Padmavati et al. (29) compared a group of CAD patients with the control group in terms of HP, CMV, and CP antibodies, and found no difference between the two groups. In a similar study, Mundkur et al. (30) found no difference between the CAD group and control group in terms of HP and CP antibodies, but a significant increase in CMV antibodies in the patient group. In a recent study, Nikitskaya et al. (31) showed that the amount of CMV viral DNA copies in the plasma of patients with ACS was higher than in healthy volunteers. Tabata et al. (32) found that HP-seropositivity and interleukin-1 polymorphisms were associated with higher levels of high-sensitivity C-reactive protein and elevated ST-segment elevation myocardial infarction risk.

When summarized, in the comparison of ACS patients with stable patients or healthy controls, there was a significant difference in terms of inflammatory markers, but no difference when AMI and USAP were compared. In the comparison of blood parameters determined after 48 hours, there was no apparent difference in the stable patients whereas there were important changes in the parameters of the ACS patients. Although the results of our study are compatible

with some of the other studies, we think that the number of patients in our study groups, the characteristics of the patients; no distinct separation in AMI, USAP, SAP, and healthy controls or uniting the mentioned disorder groups to form heterogeneous groups for comparison; and regional differences caused difficulty in drawing definite conclusions from the results obtained.

Study limitations

This study included a limited number of patients. For this reason, the data obtained cannot be generalized. Also, since the test patients and control patients in the study were consecutive patients referring to our emergency department, there were differences between these two groups in terms of anamnesis and sex. How this situation affected the results is unknown.

Conclusion

The concept of inflammation in atherosclerosis has been increasingly accepted and the proven role of inflammation in atherogenesis has attracted a lot of interest from investigators. At present, it is clear that the inflammatory process plays a key role, not only at the beginning and progression of atherosclerosis, but also in the stabilization of the atherosclerotic plaque. Defining the cellular and molecular pathways of inflammatory cytokines in the formation of atherosclerosis has now become the main aim of studies for preventing atherosclerosis in cardiovascular diseases and developing strategies for its reversal. Although our knowledge of vascular biology and clinical results of atherosclerosis has increased much in the last few years, the roles of inflammatory cytokines and the load of infectious pathogens in determining the severity of coronary disease in acute coronary events have not been fully clarified due to different results obtained in various studies. An association could not be established between the severity of the coronary lesion and the cytokine levels because of the rise in inflammatory cytokine levels, independent of atherosclerosis in acute coronary events. On the other hand, in stable patients who were not in acute stress due to angina, an association between the cytokine level and severity of coronary lesion could not be determined. To determine the association between control cytokine levels and coronary risk, further investigations with control coronary angiography and assessment of cytokine levels performed over a long period of time after acute coronary syndrome are recommended.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Meram School of Medicine (24.02.2011, Decision No: 056).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

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A Study on Knowledge, Attitude and Practices of Emergency Physicians in Management of Patients with Mental Health Disorders in the City of Hyderabad, India

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Abstract

Aim: To know if Emergency Physicians (EPs) screen mental health (MH) disorders in patients. This study aims at finding out the current knowledge, attitude and practices (KAP) of EPs and their departmental policies in management of patients with MH disorders.

Materials and methods: A personal interview based on a questionnaire was conducted with 117 EPs working in 38 multi-specialty hospitals (with minimum 50 total bed strength) across Hyderabad city, India during June 2015 to August 2015. The respondents had at least one year of experience in core emergency medicine.

Results: 85% of EPs understand MH disorders are a major healthcare burden and over 90% of them have seen mentally ill patients in Emergency Department (ED). Yet 85% rarely evaluate MH of patients. Over 2/3rd don't know any criteria of diagnosing depression and only 14% have received some training in managing MH issues of patients. 84% physicians said that their departments do not have a MH policy and 82% believe this is a major reason that evaluation of MH is ignored. 44% EPs say their attitude towards these patients is influenced by their personal experiences.

Conclusion: MH evaluation of patients is neglected in EDs. Overall management of mentally ill patients is inconsistent. Absence of a departmental MH policy and lack of training in EPs are major causes.

Keywords: Mental health evaluation, emergency physicians, emergency departments, knowledge attitude practices, mental health disorders

Introduction

Mental health (MH) disorders are a major cause of morbidity and disease burden affecting over 450 million people worldwide (1). The government of India estimates, in its MH policy, that 2 out of 10 Indians are likely to suffer from some form of mental illness by the year 2020 (2). Depression has been linked to common conditions that present to the Emergency Department (ED) such as cardio-vascular illnesses, stroke, COPD, diabetes, chronic kidney disease, and cancer (3-9). As such, the prevalence of depression was found to be higher in ED patients when compared to the general population (10). Mental disorders, if unattended to, can lead to a worse outcome of the primary illness and has been linked to longer hospital stays as these patients show poor levels of self-care (11).

Patients presenting with deliberate self-harm or suicidal attempts are not uncommon to the ED and the cause is often attributed to mental illnesses (12). The Indian National Crime Bureau Records reports more than 100,000 deaths due to suicide in the country every year from 2004 to 2014 (13). Suicide was the second leading cause of death among 15-29 year olds globally in 2012 (14). Children and adolescents may also present with non-psychiatric problems as such somatization, behavioral disturbances, or substance abuse (15). In India, there is approximately one psychiatrist per 200,000-300,000 people (16). Seeking professional help requires insight and motivation, and that becomes even more difficult with underlying social stigmas and poor awareness in society (17-19). As such, these patients end up in the ED in moments of crisis.

To address the gap between increasing the burden of mental illnesses and limited resources, the WHO suggests that primary diagnosis and basic management of MH disorders be done by primary care physicians (20). This becomes more relevant in the Indian scenario because Emergency Medicine is a new specialty. Newly established EDs are increasing in the country and it is essential that our programs and policies be more sensitive to the patients' needs. Screening patients for MH disorders in the ED is recommended (21, 22).

Hyderabad is a major Indian city with a population over 3.9 million (23). As there are no studies on MH assessment in ED in India, we

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Table 1. Exposure and awareness to MH disorders

	Question	Yes	No	Uncertain
Q1.	Have you seen a mentally ill patient in your ER that needed better treatment?	106 (90.6%)	11 (9.4%)	N/A
Q2.	Do you believe Mental illnesses are a major healthcare burden?	99 (84.7%)	6 (5.1%)	12 (10.2%)

MH: mental health; ER: emergency room

Table 2. Evaluation and referral of MH patients

	Question	Yes	No	Uncertain
Q1.	Is there a management/ referral policy in your department for mentally ill patients?	19 (16.2%)	98 (83.8%)	N/A
Q2.	Do you think MH assessment is ignored due to absence of departmental protocols?	96 (82.1%)	7 (5.9%)	14 (12.0%)
Q3.	Do you think that it is difficult to evaluate MH because of lack of time or busy ER environment?	78 (66.6%)	19 (16.2%)	20 (17.1%)
Q4.	Do you give any discharge advice to patients regarding their mental illness?	53 (45.3%)	64 (54.7%)	N/A

MH: mental health; ER: emergency room

Table 3. Knowledge and training assessment

	Question	Yes	No	Uncertain
Q1.	Have you received formal training in managing people with depression or mental disorders?	16 (13.7%)	101 (86.3%)	N/A
Q2.	Do you know of any criteria for diagnosing depression?	37 (31.6%)	80 (68.4%)	N/A
Q3.	Do you use any scale or tool to diagnose depression?	21 (17.9%)	96 (82.1%)	N/A
Q4.	Are you aware of non - pharmacological management of depression?	74 (63.2%)	43 (36.8%)	N/A
Q5.	Do you feel that due to lack of training or knowledge the identification of mental illness can be difficult?	88 (75.2%)	15 (12.8%)	14 (12.0%)

In reference to Table 3, Q1 - 12 out of the 16 EPs who said yes quoted their postgraduate curriculum in emergency medicine as formal training.
In reference to Table 3 Q3 - 15 out of the 21 EPs who said yes quoted using SADPERSONS score when dealing with patients with deliberate self-harm.

felt it important to obtain baseline data in Hyderabad. Therefore, this study aims at learning the knowledge, attitude, and practices (KAP) of Emergency Physicians (EPs) in the management of patients with MH disorders in one major Indian city.

Materials and Methods

This is an observational study where a survey was carried out during the months of June to August, 2015. 40 multi-specialty hospitals were included in the study having minimum total bed strength of 50.

This study did not interfere with existent patient care and no patient data was acquired. Only the Emergency physicians were interviewed.

An oral informed consent was taken from the medical superintendent or the Head of the ED. 38 Hospital authorities consented to the study. Our target population was EPs who had at least 1 year of experience in core emergency medicine. 117 EPs consented to participate in the study. It was explained that the confidentiality of the institute and the respondents will be maintained.

Prior to the main study a pilot survey was done at a national conference where 25 EPs from 10 different Indian cities were questioned. The pilot study helped in improving the questionnaire.

The study investigator met with each of 117 doctors and provided the questionnaire. A personal interview was conducted and direct feedback was taken. The questionnaire had 15 parts mostly based on a yes or no option. Few questions allowed descriptive answers. One major question had several sub questions where EPs were required to answer on basis of their experiences.

Data from the questionnaire was tabulated and analysis done using Microsoft Excel software. Results were later reproduced in form of tables and pie charts.

This study was approved by Institutional Ethics Committee - Clinical studies of Apollo Hospitals, Hyderabad.

Table 4. Correlation analysis to understand the impact of knowledge of criteria for diagnosing depression and the MH evaluation practices

	EPs knowing criteria for diagnosing depression	EPs not knowing criteria for diagnosing any depression	Total
EPs evaluating MH of >10 patients/month	8	8	16
EPs evaluating MH of <10 patients/month	29	72	101
Total	37	80	117

Odd's ratio: 2.48. Suggests physicians knowing criteria of diagnosing depression are more likely to evaluate mental health of patients in Emergency Room
EPs: emergency physicians; MH: mental health

Results

The data obtained from the questionnaire are presented in Table 1 (estimating exposure and disease awareness), in Table 2 (practices in evaluation and referrals), in Table 3 (training and knowledge), and in Table 4 (attitude).

EPs were asked to explain their reason for seeking psychiatric referrals, to which 80/117 responded. The responses were variable; yet, deliberate self-harm or suicidal attempt was the most common reason for psychiatric referral quoted by 55/80 physicians. EPs were also asked to elaborate the discharge advice they gave to patients regarding their mental illness. 35/53 responded with answers like "counseling the patient," (14/35) "counseling the family," "avoiding the trigger," and "exercise and meditation."

Resources availability

102/117 (87.2%) physicians said their hospital has a psychiatrist available during OPD hours, but not 24/7. Less than 20% of hospitals

Table 5. Attitude towards MH disorders

	Question	Yes	No	Uncertain
Q1.	Do you think EPs have no role in management of mental illnesses?	14 (12.0%)	79 (67.5%)	24 (20.5%)
Q2.	Do you feel patients with MH disorders are treated as unwelcome in ER?	47 (40.2%)	35 (29.9%)	35 (29.9%)
Q3.	Do you feel the awareness about MH disorders is very poor in ER staff?	71 (60.7%)	17 (14.5%)	29 (24.8%)
Q4.	Is your approach to patients with mental illness influenced by your own personal (not clinical) experiences in handling the same?	52 (44.4%)	32 (27.4%)	33 (28.2%)
Q5.	Have you experienced that patients or their family DO NOT take the advice for a psychiatric referral kindly?	69 (58.9%)	15 (12.8%)	33 (28.2%)

EP: emergency physicians; ER: emergency room; MH: mental health

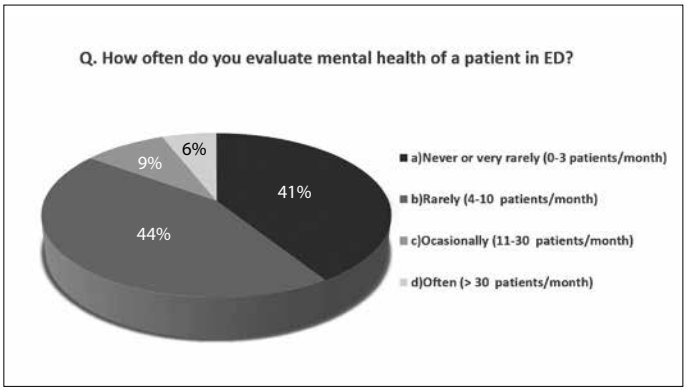

Figure 1. 85% (a+b) of Emergency physicians rarely or almost never evaluate the mental health of patient

had inpatient facilities for psychiatric patients. A psychologist and rehabilitation programs were found in less than 10% of the hospitals surveyed.

Pilot study: In the pilot study, 84% (21/25) of EPs said their departments did not have a management policy for MH disorders and 92% (23/25) did not receive any training to handle MH disorders.

Discussion

This study showed that over 90% EPs have come across mentally ill patients. Most of them also agreed that MH disorders are a major healthcare burden (Table 1). This suggests awareness about disease burden exists and that MH related patient visits are not uncommon to EDs.

85% of EPs rarely or never evaluate MH of patients (Figure 1). Assessment was mostly done for patients in whom the presenting complaint or behaviour was obviously indicative of a mental illness. This suggests that MH evaluation is a neglected aspect in ED domain. This also suggests that patients with an occult MH disorder may be not receiving adequate treatment as no screening is done.

More than 80% physicians said their ED has no management or referral policy for MH disorders and 82% said this is a major reason why evaluation of mental health is ignored (Table 2). Criteria for seeking a psychiatric referral and the discharge advice given to patients concerning their MH varied from EP to EP. Lack of clear guidelines or a protocol that helps in decision making were found to be main reasons for the inconsistencies in management and disposition of these patients.

Most of EPs haven't undergone any formal training in managing patients with MH disorders and over 75% say this is a reason why identification of mental illness in patients becomes difficult (Table 3). Over 2/3rd EPs do not know any criteria of diagnosing depression and over 80% did not use any tool or scale to diagnose depression. This may be because psychiatry as a subject is not emphasised in the undergraduate period or ignored in the EDs. Less than 10% EPs quoted postgraduate curriculum and exams as training. This suggests EPs with only 1 year experience or having lesser qualifications are not getting trained in this aspect. It was also found that EPs who knew criteria of diagnosing depression were more likely to evaluate the mental health of patients (Table 4) suggesting the positive impact of training that can have on evaluation practices. Most of the multi-speciality hospitals have a psychiatrist but only during limited OPD hours. None of the hospitals surveyed had a mental healthcare professional available 24/7. This suggests that mental illnesses are not considered as medical emergencies by the management. Less than 20% hospitals surveyed had inpatient facilities for these patients and below 10% surveyed had a psychologist or mental rehab/support programs. Mentally ill patients are considered as speciality cases and are referred to psychiatric hospitals.

Majority of EPs said that awareness about MH disorders is very poor in their ED staff and have felt that patients with mental illnesses were treated as unwelcome in ED. 60% EPs have experienced patients or their family members don't take the advice for a psychiatric referral kindly considering it unnecessary. 44% of EPs said their approach and attitude to patients with MH disorders is affected by their own personal experiences (Table 5). These observations suggest that underlying prejudice and stigma associated with mental illnesses may negatively impact overall management.

Study limitations

The results of this study were based on the individual responses of EPs and their understanding of their working environment. They may or may not depict the exact functionality of their departments. As such, separate studies are recommended within individual hospitals.

Conclusion

Mental health of patients is rarely assessed in EDs. Most of the EDs have no departmental policy on mental illnesses and EPs are not trained to handle MH related issues in patients. As such referral practices and the discharge advice given to patients regarding MH are inconsistent. EP's attitude to these patients is often influenced by their own personal experience. Most of the hospitals do not have adequate resources for mentally ill patients. Urgent actions are warranted at departmental and community level to create awareness about and to tackle this problem effectively.

Recommendations

1) MH assessment and screening for mental illness should be done along with physical examination for all patients in the ED.

2) It is strongly recommended that a departmental MH policy is established.

3) Training of EPs and ED staff is mandated in managing MH-related issues in busy ED environments.

4) Provision of inpatient facilities and a 24/7 on-call MH care professional should considered by all hospitals.

Ethics Committee Approval: Ethics committee approval was received for this study from the Institutional Ethics Committee of Apollo Hospitals (16.12.2016, Decision No: AHJ-025/12-16).

Informed Consent: Verbal informed consent was taken from the medical superintendent or the Head of the ED.

Peer-review: Externally peer-reviewed.

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The Diagnostic Value of SCUBE1 in Unstable Angina Pectoris Patients

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Abstract

Aim: Signal peptide complement C1r/C1s, Uegf, and Bmp1-epidermal growth factor-like domain-containing protein 1 (SCUBE1) has been used in research as a biomarker in acute coronary syndrome (ACS). The aim of this study is to determine if SCUBE1 and routine laboratory parameters are effective in distinguishing the patients presenting with clinical symptoms of unstable angina pectoris (USAP) from the patients who have non-ST-segment elevated myocardial infarction (NSTEMI) and non-cardiac chest pain patients (NCCP).

Materials and Methods: The study group consisted of patients having chest pain or those suspected of having an ACS complaint. The study consisted of 5 groups of 185 patients with USAP, NSTEMI, segment elevation myocardial infarction (STEMI), or NCCP, and a control group of 45 healthy patients (CG). The study was conducted according to the American Heart Association (AHA) guidelines.

Results: There was no statistical difference between the patient groups and CG in terms of SCUBE1 ($p=0.650$). The Troponin I value was significantly lower in the USAP group than the STEMI and NSTEMI groups ($p<0.001$). There was no difference among the sub-groups of USAP in terms of the SCUBE1, GENSINI, and the GRACE scores ($p=0.485$, 0.932, 0.585, respectively).

Conclusion: SCUBE1 was not diagnostic for USAP, NSTEMI, and STEMI. Further studies to understand the value of SCUBE1 in ACS are needed.

Keywords: Acute coronary syndrome, unstable angina pectoris, SCUBE1

Introduction

Acute coronary syndrome (ACS) develops when there is a misbalance between supplying oxygen to the myocardium and the myocardium's need for oxygen. Unstable angina pectoris (USAP) is attributed to the group of patients whose electrocardiography (ECG) does not show any biological symptoms of chest pain, or the equivalent of ACS, and whose biological indicator does not increase (1). The patients presenting with symptoms of chest pain or symptoms relating to ACS who do not have persistent ST-segment elevation but have pathological findings in electrocardiography (ECG), and whose Troponin I values are high, are defined as non-ST-segment elevated myocardial infarction (NSTEMI) (2).

The evaluation of patients presenting with chest pain in the emergency and outpatient environment are completed using the combination of biochemical examinations that reflect clinical history, examination findings, ECG, and myocardial ischemia (3). As ischemic biomarkers, sensitive cardiac Troponin I assays (with an ability of detection below the 99th percent of a reference population and improved precision) have recently become available in clinical practice (4-7). Many types of parameters are used to distinguish USAP patients from non-cardiac chest pain patients (NCCP) patients (8). Even though the specificity and the sensitivity of Troponin I are high in myocardial infarction (MI), it is not enough to distinguish the USAP patients from the NCCP patients; and in order to detect it in the blood, time is needed. Therefore, new and more convenient bio-

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chemical parameters are needed. SCUBE1 has been recently used as an early indicator for the diagnosis of ACS (9).

The molecules of SCUBE1 are stored inside the alpha granules in the inactive platelets. After the activation by thrombin, it is translocated to the surface of the platelet, secreted as small soluble forms, and incorporated into the thrombus. The accumulation of SCUBE1 is detected in human beings as immunohistochemistry in the sub-endothelial matrix of advanced atherosclerotic lesions (4). Our primary goal in this study was to evaluate whether SCUBE1 and routine laboratory parameters are effective in differentiating patients presenting with the clinical symptoms of USAP from the ones with NSTEMI and NCCP. Our second goal was to evaluate whether SCUBE1 would be a predictive biochemical indicator of the prevalence and severity of coronary artery disease in all patients.

Materials and Methods

Study design

This study was approved by our institutional ethical review boards. Written informed consent was obtained from the participants. The investigation conforms to the principles outlined in the Declaration of Helsinki.

Study population

In this study, 220 patients who had chest pain, sweating that gave the impression of ACS, shortness of breath, nausea, stomach ache, fainting problems that are equal to angina symptoms, and 45 healthy volunteers participated. Thirty-five of the participants were omitted because of their refusal of treatment, lack of data in their files, or laboratory mistakes. The study groups were designed according to AHA criteria (2). Patients were classified into four groups: USAP (n=44) because there was a myocardial ischemia without myocardial necrosis; NSTEMI (n=50) because they were associated with elevated myocardial necrosis markers and without any elevation in ST-segments in the ECG; segment elevation myocardial infarction (STEMI) (n=45) because they had acute chest pain and/or persistent (>20 min) ST-segment elevation and elevated necrosis markers; and NCCP (n=46). The verification of the ACS diagnosis was done by angiography. In total, 230 patients were enrolled (including the control group (CG) consisting of 45 healthy individuals). USAP and NSTEMI groups were classified into three groups according to their GRACE scores: 1-108=low, 109-140=average, and 141-372=high. The GENSINI score was classified into two sub-categories: 0-19=mild, >20=serious. Blood samples were collected from the patients on admission to the emergency department for their complaints. We studied the SCUBE1, Troponin I, and creatine kinase-MB (CK-MB). A power analysis (1-β=0.9, α=0.05) determined that a NCCP size of 16 patients and a CG size of 13 patients were sufficient to stratify this patient cohort; 91 patients in total (NCCP: 46 and CG: 45) were enrolled.

Exclusion criteria

People under 18 years of age, people who had problems in the last one month such as pulmonary embolism, ischemic stroke, deep vein thrombosis, peripheral arterial embolism, pneumonitis, ACS, transient ischemic attack, pulmonary edema, hemorrhagic stroke, serious valvular heart disease, myocarditis, endocarditis, coronary artery bypass grafting, and coronary percutaneous cases were excluded from the study. Renal impairments with serum creatinine levels higher than 2.5, hepatitis with elevated liver enzymes, cancer, hematologic diseases, and rheumatology diseases were also excluded from the study. Lastly, pregnant or recently postpartum females were excluded.

Preparations of samples and measurements

Blood samples were collected from the patients on admission. For SCUBE1 measurements, blood samples were kept 10-20 minutes, and centrifuged at 3000 cycle/min for ten minutes and then kept at -30 degree Celsius in a freezer. Before the measurements, the samples reached room temperature. An ELISA study was conducted with SCUBE1 (Human Signal Peptide, Cub and Uegf-like Domain Containing Protein 1, Elisa Kit, Bioassay Technology Laboratory, Catalogue Number: E3142hu. Crystal Day Biotech Co. Ltd., China). The test results were compared with other patient parameters.

Statistical analysis

The data obtained from the study was calculated through the program IBM Statistical Package for Social Sciences version 20 (IBM SPSS Statistics; Armonk, NY, USA). Quantitative data were expressed as median, min-max; and qualitative values were expressed as a percentage. Chi-square analysis was performed for nominal data. End group analysis was performed. The Kolmogorov-Smirnov test was used to evaluate whether the numerical variables were normally distributed or not. Groups and subgroups did not show normal distribution. Accordingly, a Kruskal-Wallis analysis was used, and statistically significant differences were seen between the patient subgroups ($p<0.01$). A Bonferroni corrected Mann-Whitney U test was used to assess the differences ($p=0.05/10=0.005$). Spearman correlation analysis was performed to evaluate the relationship between SCUBE1 levels and variables. Calculated p values less than 0.05 were considered statistically significant.

Results

There was no correlation between SCUBE1 values and age. There was no significant difference between the patients and the CG groups in SCUBE1 values ($p=0.65$) (Figure 1). Troponin I values were different among the patients and the CG groups ($p<0.001$). Troponin I levels in the USAP, NSTEMI and STEMI groups were significantly higher than the NCCP group ($p<0.001$). Troponin I levels in the USAP group were significantly lower than the STEMI and NSTEMI groups ($p<0.001$) (Figure 2).

In NSTEMI and STEMI groups, CK-MB values were significantly higher than the NCCP and CG groups ($p<0.001$). Routine hematologic parameters were calculated (Table 1).

In terms of the risk factors for ACS, 40 of the 44 USAP patients (52.3%) had chronic atherosclerosis disease in their previous patient history (Table 2). There was no difference among the USAP middle-low and high-risk sub groups in terms of SCUBE1, GENSINI, and GRACE scores ($p=0.481$, 0.932, and 0.585, respectively) (Table 3). There were no differences for SCUBE1 values between the low and high-risk groups in the GENSINI, which were calculated according to the angiography results of the USAP, NSTEMI, and STEMI groups ($p=0.59$). In the values of GRACE's inside-hospital risk scoring, there was no difference among the three groups, which were categorized as low, middle, and high risk for the values of SCUBE1 ($p=0.370$). There were differences among the groups that were categorized as

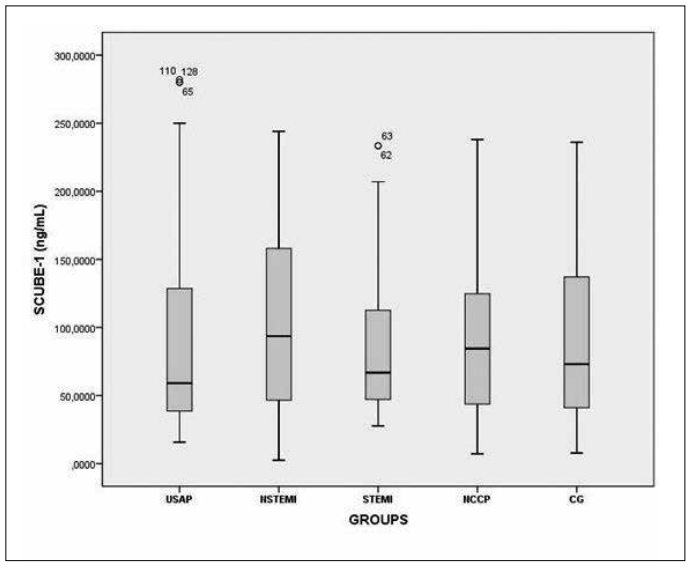

Figure 1. SCUBE1 values distribution according to groups

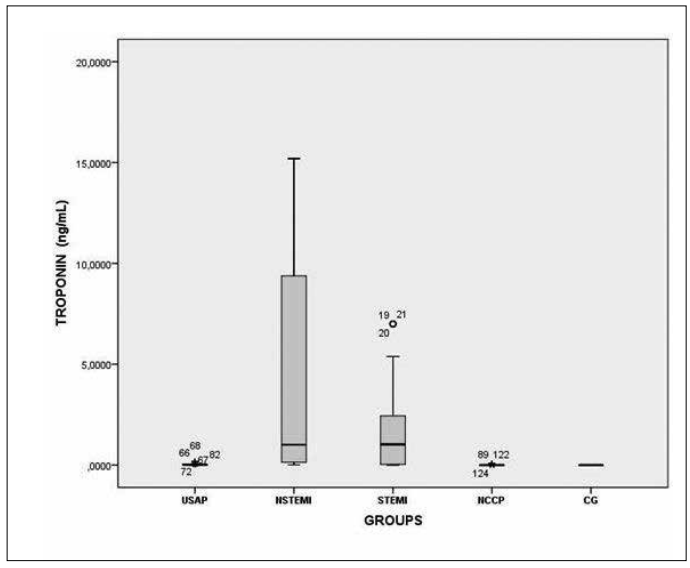

Figure 2. Troponin I values according to groups

Table 1. Statistical significance of variables according to study groups

	USAP	NSTEMI	STEMI	NCCP	CG	P*
SCUBE1, ng/mL	93, 15-282	103, 2-244	88, 27-233	90, 7-238	93, 7-236[b]	0.65
Age, years	58, 32-84[a,c]	62, 32-87[a,b,e]	63, 36-89[a,b,e]	49, 18-84[a,c,d]	35, 17-71[b,c,d,e]	<0.001
Troponin I, ng/mL	0.02, 0-0.1[a,c,d,e]	4, 0-15,2[a,b,e]	2, 0-7 [a,b,e]	0, 0-0.04[b,c,d]	0, 0-0[b,c,d]	<0.001
CK-MB (ng/dL)	20, 11-43[e]	30, 1-76[a,e]	31, 4-70[a,e]	14, 1-27	15, 3-24[c,d]	<0.001
GENSINI score	19, 0-116[a,d,e]	33 0-139[a,e]	48, 0-147[a,b,e]	0, 0-0[b,c,d]	0, 0-0[b,c,d]	<0.001
GRACE risk score	90, 47-152[a,c,d,e]	110, 41-168[a,b,d,e]	142, 94-202[a,b,c,e]	0, 0-0[b,c,d]	0, 0-0[b,c,d]	<0.001
MPV, fL	10, 8-12[a,c,d,e]	9, 5-12 [a,b]	9, 7-12 [a,b,e]	8, 6-11[b,d]	7, 6-10[b,c,d]	<0.001
Hemoglobin, g/dL	13, 7-17	13, 7-16	13, 9-17 [e]	12, 12-15[a]	13, 12-14[e]	0.011
Neutrophils,	58, 43-82[a]	62, 22-88[a,]	62, 46-95[a]	54, 35-77	52, 49-65[b,c,d]	<0.001
Lymphocytes,	31, 10-41[a]	27, 5-46[a,]	28, 4-42[a]	35, 6-50[a]	36, 26-39[b,c,d,e]	<0.001
WBC, 10^3/µL	7.2, 4.5-11.4	9.2, 4.7-15.7	11.2, 5.3-21.1	8.4, 4.3-14.2	7.7, 5.0-9.9	0.523
PCT ng/mL	0.2, 0-0.4[a,c,e]	0.2, 0-0.3[b]	0.2, 0.1-0.4	0.19, 0.16-0.39	0.19, 0.16-0.39[b]	0.003
PLT, 10^3/mL	251, 120-451	238, 118-317	239, 119-464	221, 171-456	263, 172-456	0.498
Creatinine, mg/dL	0.8, 0.4-1.4[d]	0.8, 0.5-4.2[a]	0.8, 0.5-2.1[a,b]	0.7, 0.6-1.3	0.6, 0.6-0.9[c,d]	<0.001
RDW fl	42, 16-63	42, 34-48	41, 38-48	40, 37-47	42, 34-48	0.213
PDW fl	12, 9-21[a,c,d,e]	17, 10-20[a,b,d,e]	18, 10-21[b,c]	18, 17-21[b,c]	18, 16-19[b,c]	<0.001
AST, 0-45 IU/L	20, 13-60[d]	26, 5-131[a,e]	32, 12-133[a,b,e]	18, 8-47[c,d]	19, 14-21[c,d]	<0.001
ALT, 0-45 IU/L	22, 11-66[a,e]	17, 8-60	23, 8-173[a,e]	17, 10-29[b,d]	17, 8-19[b,d]	<0.001

USAP: unstable angina pectoris; NSTEMI: non-ST-segment elevated myocardial infarction; STEMI: segment elevation myocardial infarction; NCCP: non-cardiac chest pain patients; CG: control group of 45 healthy patients; CK-MB: creatine kinase MB; WBC: white blood cell; PLT: platelet; PDW: platelet distribution width; RDW: red cell distribution width; MPV: mean platelet volume; PCT: plateletcrit; AST: aspartate aminotransferase; ALT: alanine aminotransferase
Data are presented as median, min-max values
*Kruskal-Wallis H Test
[a]p<0.005 Control (Bonferoni corrected Mann-Whitney U Test)
[b]p<0.005 USAP (Bonferoni corrected Mann-Whitney U Test)
[c]p<0.005 NSTEMI (Bonferoni corrected Mann-Whitney U Test)
[d]p<0.005 STEMI (Bonferoni corrected Mann-Whitney U Test)
[e]p<0.005 NCCP (Bonferoni corrected Mann-Whitney U Test)

Table 2. The frequency rate of diseases among the groups

	USAP, n=44	NSTEMI, n=50	STEMI, n=45	NCCP, n=46	CG, n=45
CAD	23, 52.3%	10, 20.0%	7, 16.3%	0, 0.0%	0, 0.0%
DM	18, 40.9%	11, 22.0%	13, 28.9%	0, 0.0%	0, 0.0%
Smokers	7, 15.9%	8, 16.0%	11, 24.4%	0, 0.0%	0, 0.0%
HL	7, 15.9%	7, 14.0%	0, 0.0%	0, 0.0%	0, 0.0%
HT	27, 61.4%	23, 46.0%	15, 33.3%	2, 4.8%	0, 0.0%
COPD	1, 2.3%	1, 2.0%	8, 17.8%	0, 0.0%	0, 0.0%

USAP: unstable angina pectoris; NSTEMI: non-ST-segment elevated myocardial infarction; STEMI: segment elevation myocardial infarction; NCCP: non-cardiac chest pain patients; CG: control group of 45 healthy patients; CAD: coronary artery disease, DM: diabetes mellitus, HL: hyperlipidemia, HT: hypertension, COPD: chronic obstructive pulmonary disease
Data presented as number (percentage)
*Chi-square test

Table 3. The scoring values of SCUBE1 in GENSINI and GRACE among the sub groups of USAP

USAP		SCUBE1	GENSINI	GRACE
High risk	n	25	25	25
	Average	106	18	92
	Standard deviation	90	28	21
	Median	82	6	88
	Lowest	16	0	55
	Highest	351	116	152
Middle-low risk	n	19	19	19
	Average	79	19	87
	Standard deviation	74	30	23
	Median	53	7	88
	Lowest	15	0	47
	Highest	282	100	142
	p	0.485	0.932	0.585

USAP: unstable angina pectoris

low, middle, and high in calculations of the six-month risk GRACE scores (p=0.022). The NSTEMI group had a higher six-month risk GRACE score than the USAP group.

Discussion

In our study, we aimed to find SCUBE1's efficacy in separating USAP and NSTEMI, which was already studied in various ischemic situations because ACS, ischemic stroke, and CAD showed positive results (4, 9) Also, we aimed to discover if SCUBE1 levels can differentiate the NCCP patients from the ACS patients. We compared some parameters and two ACS scorings with SCUBE1: Troponin I, CK-MB, and the degrees of GRACE and GENSINI scores.

Troponin I and CK-MB are used in the diagnosis of myocardial infarction as cardiac indicators all around the world. However, their roles are limited in USAP diagnosis and require time for diagnosis (10, 11). Before the start of myocardial necrosis in the early period when the coronary perfusion defects occur, novel indicators will have an important necessity in diagnosis and treatment.

The SCUBE1 protein was first reported in the field of inflammation. Initially, SCUBE1 was only thought to be secreted in endothelial cells (12). In the study they conducted, Karabacak et al. (13) revealed that there was a meaningful difference between the SCUBE1 rates of hypertensive crises patients who presented to emergency services in comparison with a healthy control group. It is thought that this result can be related to probable endothelium damage. Tu et al. (14) showed that SCUBE1 was secreted at a higher rate than thrombocytes. It is known that thrombocyte aggregation accounts for ACS and acute ischemic stroke. Studies have proved that SCUBE1 is secreted from an active thrombocyte surface (4). They showed that it is secreted from alpha granules following thrombocyte aggregation and SCUBE1 is contained in the human RNA as well. Moreover, SCUBE1 was detected in thrombus and atherosclerotic lesions that are rich in thrombocytes (15). In the study of Mentese et al. (16), it was stated that the reason for the higher SCUBE1 level found in a gastric cancer study can be related to high thrombosis existing in probable malignancies. It is not clearly understood how SCUBE1 functions in atherosclerotic plaques and thrombus or why it is secreted by active thrombocytes.

In their study, Dai et al. (4) showed that plasma SCUBE1 is measurable in plasma for about four days, and starts to rise within 6 hours after thrombocyte activation. However, the rapid rise of SCUBE1 was shown in the study by Turkmen et al (17), in which they found SCUBE1 rises rapidly 2 hours after the start of acute mesentery ischemia. SCUBE1 was considerably higher in comparison to the control group in chronic CAD, ACS, and acute ischemic stroke (AIS). Nevertheless, they expressed it would not be accurate to establish a meaningful correlation with a single measurement of SCUBE1 in the control group (12). Peacock WF, from Ohio University, said that the study by Dai et al. (4) was a promising indicator; but he criticized the mistakes in methodology in the study (18). Sonmez, one of our authors, previously studied SCUBE1 in ACS patients. In that study, in terms of SCUBE1, there were significant differences between the NSTEMI and NCCP groups (8). But there were no significant differences between the CG group and the patients in terms of SCUBE1 in our study (p=0.65).

Troponin I rates were found to be significantly higher in the NSTEMI and STEMI groups than in the NCCP group. Troponin I could

distinguish NCCP patients from MI patients, and it was detected as significantly lower than the NSTEMI group in the USAP group. The parameters for Troponin I in our study were compatible with the literature (19). Francis et al found in their study, which was conducted with 710 patients, that CK-MB rates detected the ACS patients (20). CK-MB was high in ACS patients in our study as well. Considering the research, there emerged contradictory results in similar studies of SCUBE1. In our opinion, one of the reasons may be the studying techniques and kit differences. Another reason may be the blood sampling times. But in this, and the previous studies, blood sampling times were not classified in the patients. There might be other reasons as well. We are of the opinion that new research is needed to discuss this issue.

Study limitations

Blood sampling times were not classified for the patients. It might have affected the results. This study resulted as negative for SCUBE1 to diagnose any ACS. As far as we know, the kit that we used was different from the previously used kits. The lack of positive or negative findings for this kit was the limitation for efficient discussion. We did not classify the time between the patients' admission to the emergency department and the start of their complaints.

Conclusion

In our study, we found that SCUBE1 was not an effective marker for USAP and other ACS patients. No negative or positive correlations were detected between the values of SCUBE1 and the scorings of GENSINI and GRACE. The contradictory results were gathered from studies done with SCUBE1 and further studies are needed to enlighten this point.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

Informed Consent: Written informed consent was obtained from participants who participated in this study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the authors.

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Why Do Relatives of Patients at the Emergency Room Get Angry? Turkey

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Abstract

Aim: The purpose of this descriptive study was to examine the anger states of the relatives of critically ill patients admitted to the emergency departments and the reasons for these anger states.

Materials and Methods: The study was conducted at the Emergency Department of a University Hospital between September 2013 and January 2014; 202 relatives of critically ill patients who matched the inclusion criteria and accepted to participate were included in the study. The "questionnaire," which was prepared by the researcher in line with the literature and involved the demographic characteristics of patient relatives and reasons of their anger at the emergency department, was used as the data collection tool.

Results: It was determined that 29.2% of the patient relatives were enraged by the emergency department; 18.6%, about the registration procedures; 45.8%, about the treatment duration; 42.4%, about the deficiency of treatment; 13.6%, about the deficiency of medical staff; 3.4%, about the deficiency of the waiting environment; 49.2%, about the lack of information; 39.0%, about the lack of communication; 44.1%, about the irrelevance of the medical staff; and 57.6%, about the waiting time. It was noted that 32.2% would have decreased anger if the waiting time was reduced.

Conclusion: Summarily, it is considered that making the required explanations to patients/patient relatives, providing large and comfortable recreation places where they can wait, increasing the number of medical staff, and approaching patients with an empathetic attitude will increase the satisfaction of patients/patient relatives, meet their expectations, minimize communication problems, and decrease anger levels.

Keywords: Patient relatives, emergency department, rage

Introduction

Individuals experience a number of feelings like anxiety, excitement, sorrow, pleasure, and fear in the face of various events in their daily lives in the ever developing and complicating world. One of these feelings is anger. Anger is one of the five basic feelings-the others being happiness, sorrow, fear, and hate-that is experienced by a person and is a natural affection for human beings (1-3). Anger is defined as a strong feeling that is related to cognitions appearing against any real or supposed frustration, threat, or injustice, and it prompts the person to remove the disturbing stimulants (4).

One of the areas-probably the most important one-where anger management is crucial is the health sector. It could be asserted that in this sector, the unit being exposed to anger and violence the most often is the emergency unit. Every individual has different ways of expressing their feelings. Disputes experienced between the medical staff and patients/patient relatives are not surprising. Patients usually express their anger either directly or indirectly by rejecting the treatment and care, refusing to cooperate, making frequent demands, verbal bullying or using sarcastic words, and constant complaining. They are mostly unable to explicitly express their anger, and consequently, try to express their anger indirectly as they are dependent on others for their care (5).

Emergency departments are units that provide medical evaluation and treatment for patients that have met with accidents or require emergency intervention. Physicians, nurses, and other medical staff working in this department realize the treatment and care of emergency patients as a team by focusing on specific goals (6). Studies have determined that a majority of patients are admitted to the emergency department because of the following: perceiving

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themselves and their relatives as emergency cases, living close to the emergency department, waiting for a shorter time to be examined, being unable to get in line in relevant polyclinics, demanding prescriptions or reports, and having parenteral practices (7).

Emergency personnel are under constant stress because of the department's environment, excessive number of patients to be taken care of, patient deaths, sleep disorders, and intensive work schedules (8). Patients and patient relatives, on the other hand, usually have fear and anxiety because they do not know what to do. They expect emergency intervention as they consider their condition more urgent than the other patients, and society has not adopted the necessity for triage yet. This usually causes disputes between the emergency staff and patients/patient relatives.

This study was conducted in order to determine the anger states of the relatives of critically ill patients admitted to the emergency department and the reasons for these anger states.

Materials and Methods

Study design

This descriptive and cross-sectional study was conducted in order to examine the anger states of the relatives of critically ill patients admitted to the emergency department and the reasons for these anger states.

Time and place of the study

This study involved 202 relatives of critically ill patients at the Emergency Department of the Ataturk University Research Hospital from September 3, 2013 to January 30, 2014.

Population and sample group of the study

While the population of the study consisted of all the relatives of critically ill patients who applied to the Emergency Department of the Ataturk University Research Hospital between the specified dates, the sample group consisted of 202 relatives of critically ill patients who applied to the emergency clinic between the specified dates, met the inclusion criteria, and accepted to participate in the study.

Because the needs of the relatives of patients, who were followed-up for more than 24 hours at the emergency department, could change (Redley B, Beanland), the data of the study were collected by interviewing with patient relatives that met the inclusion criteria at the emergency department and attended on patient, who was followed up at the emergency department, within the first 24 hours.

Inclusion criteria of the study:

- Being a relative of the patient admitted to the emergency department and meeting the emergency and serious criteria,
- Being older than 18,
- Having no previous or present psychiatric problems.

Data collection

Data collection tools

Being developed by the researcher in line with literature and consisting of a single part, the questionnaire included questions regarding the demographic characteristics of patient relatives, emergency department, and anger reasons of patient relatives in the emergency department.

Data collection method

The patient relatives who participated in the study were informed about the objective of the study and that the information would not be used anywhere other than the study, and their verbal consents were received. The study data were collected by the researcher conducting a face-to-face interview with the patient relatives within the first 24 h after being admitted to the hospital. The data collection process took approximately 8–10 min for each person.

Data assessment

The study data were analyzed using the Statistical Package for the Social Sciences (SPSS Inc.; Chicago, IL, USA) version 16.0. Percentage distribution, mean, and chi-square tests were used to assess the data. In the comparison of the groups in terms of independent variables, variance was used for the data exhibiting a normal distribution and the Mann-Whitney U test and Kruskal-Wallis test were used for the data exhibiting no analysis distribution. While examining the intergroup difference, 0.05 was used as the significance level. A significant intergroup difference was indicated as $p<0.05$ and no significant intergroup difference as $p>0.05$.

Ethical principles of the study

An ethical committee approval was received from the Health Sciences Faculty of Ataturk University in order to conduct the study; further, official permission was taken by presenting an information form describing the objective and scope of the study to the Head Physician of the Erzurum Ataturk University Research Hospital in order to implement the study. Since the use of human phenomenon in studies requires the protection of personal rights, the patient relatives were verbally informed about the objective of the study. They were told that their personal information would be protected after being shared with the researcher and that the acquired information and identity of the answerer would be kept confidential. They were allowed to withdraw from the study at any time. Thus, verbal permissions from the patient relatives were received by fulfilling the ethical principles of "Informed Consent," "Autonomy," and "Confidentiality and the Protection of Confidentiality."

Generalizability of the study

The results obtained from the study could be generalized to the relatives of critically ill patients coming to the Emergency Department of Ataturk University Research Hospital, however they could be also used in studies conducted in different emergency departments.

Results

By examining the descriptive characteristics of patient relatives that were included in the study (Table 1), it was determined that 38.7% of the patient relatives were in the age range of 38 years and above; 54.5%, female; 44.6%, high school graduates; 29.7%, civil servants or housewives; 46.5%, insured by the Social Insurance Institution; and 42.3%, children of the patients based on their affinity with the patient.

Table 2 illustrates the distribution of the characteristics of patients and patient relatives with regard to the emergency department. Evidently, 44.6% of the patient relatives came to the emergency department between 08:01 and 16:00, 86.6% of the patient

Table 1. Distribution of descriptive characteristics of patient relatives

Characteristics	Number	Percentage
Age Group		
18–27 years	64	31.6
28–37 years	60	29.7
38 years and older	78	38.7
Gender		
Female	110	54.5
Male	92	45.5
Education		
Primary School	57	28.2
High School	90	44.6
University	55	27.2
Occupation		
Housewife	60	29.7
Civil servant	60	29.7
Worker	34	16.8
Student	25	12.4
Craftsman	17	8.4
Retiree	6	3.0
Health Insurance of the Patient:		
Social Insurance Institution	94	46.5
Retirement fund	52	25.7
Social security organization for artisans and the self-employed	29	14.4
Green Card	27	13.4
Affinity with the Patient		
Spouse	31	15.2
Child	85	42.3
Parent	16	7.9
Sibling	20	9.9
Friend	14	6.9
Relative	36	17.8
Total	202	100

Table 2. Distribution of characteristics of patients and patient relatives with regard to the emergency department

Features	Number	Percentage
Arrival time in the emergency department		
08:01–16:00	90	44.6
16:01–24:00	57	28.2
24:01–08:00	55	27.2
State of coming to the emergency department		
With the patient	175	86.6
After the patient	27	18.4
Patient's complaint		
Cardiovascular system	43	21.3
Trauma-accident	41	20.8
Respiratory system	40	19.8
Neurologic diseases	31	15.3
Suicide	17	8.4
Gastrointestinal system	16	7.9
General condition deterioration	14	6.9
Unit where the patient was transferred to		
Hospitalized to relevant service	106	52.4
Intensive care	42	20.8
Discharged to home	27	13.4
Those who were not transferred	27	13.4
Patient's diagnosis		
Trauma-accident	44	21.8
Cardiovascular system	43	21.3
Respiratory system	38	18.8
Poisoning	26	12.9
Hematologic-oncologic diseases	20	9.9
Neurologic diseases	17	8.4
Endocrine system diseases	9	4.5
Gastrointestinal system	5	2.4

relatives came with the patient, 21.3% of the patients had a cardiovascular complaint, 52.4% of the patients were transferred to the relevant department, and 21.8% of the patients were admitted because of a trauma/accident.

Table 3 illustrates that 45.8% of the patient relatives were enraged about the treatment duration; 42.4%, about deficiency of treatment; 49.2%, about lack of information; 39.0%, about lack of communication; 44.1%, about irrelevance of the medical staff; and 57.6%, about the waiting time. It was observed that 32.2% of the patient relatives would have decreased anger if the waiting times were reduced.

Discussion

Anger is frequently experienced between the patients/patient relatives and the medical staff in emergency departments (9). Patient relatives have close feelings with the patients with regard to their psychological state and become angry and anxious unless an effort is made to understand their feelings and they are respected. The presence of angry patient relatives may subject the medical staff to violence (10).

It is indicated that patients and patient relatives may occasionally have an increased level of anger toward emergency services personnel, which may result in violence (11-13). In these studies, the patient relatives experiencing anger were determined to be in the age range of 18–27 years, male, and university graduates. The studies

Table 3. Distribution of characteristics of patient relatives with regard to the state of rage

State of raging in the emergency service		
Yes	59	29.2
No	143	70.8
State of raging about registration procedures (n=59)		
Yes	11	18.6
No	48	81.4
State of raging about treatment duration (n=59)		
Yes	27	45.8
No	32	54.2
State of raging about deficiency of treatment (n=59)		
Yes	25	42.4
No	34	57.6
State of raging about deficiency of medical staff (n=59)		
Yes	8	13.6
No	51	86.4
State of raging about deficiency of the waiting environment (n=59)		
Yes	2	3.4
No	57	96.6
State of raging about lack of information (n=59)		
Yes	29	49.2
No	30	50.8
State of raging about lack of communication (n=59)		
Yes	23	39.0
No	36	61.0
State of raging about irrelevance of medical staff (n=59)		
Yes	26	44.1
No	33	55.9
State of raging about waiting duration (n=59)		
Yes	34	57.6
No	25	42.4
What to do to remove the anger(n=59)		
Reduce the durations of waiting	19	32.2
Make sufficient explanations/reduce the waiting duration /train the medical staff about communication	15	25.4
Make sufficient explanations	9	15.3
Train the medical staff about communication Reduce the durations of waiting/increase the number of medical staff/train the medical staff about communication	8 6	13.6 10.2
Increase the number of medical staff	2	3.4

also determined that enraged patients/patient relatives were male and younger when compared to those who were not enraged (14, 15). In the study conducted by Erkol et al. (16), it was determined that the patient relatives had particularly greater anger than patients: men aged between 21 and 30 years had higher levels of anger and greater inclination toward violence. The result of this study shows a similarity with the studies of Dolan et al. (14), Mellesdal (15), Erkol et al. (16), and Ketelsen et al. (17). In the study conducted by Raja and Azzoni (18), they determined that there was no difference between the educational backgrounds of enraged patients/patient relatives. In this study, on the other hand, university graduates were observed to have greater anger. This may be due to the fact that university graduates requested to get information about their patients from the medical staff more frequently, and consequently, had higher levels of expectations. The emergency departments generally have the greatest density of patients between 16:00 and 20:00, and it is observed that patients/patient relatives have higher levels of anger and violence during these hours (19). In this study, it was observed that patient relatives had higher levels of anger between 16:00 and 24:00, which is similar to the results of the study of Lau (19). This situation can be associated with excessive intensity of patients at the emergency rooms during evening hours, and therefore, increased anger levels of the patient relatives. It is indicated that patients/patient relatives have higher levels of anger and violence and this is frequently experienced in the field of healthcare services, particularly in emergency departments (20). In this study, 29.2% of the patients were enraged. Similar to this result, the study of Ayranci et al. (12) showed that acts of violence were experienced at a higher rate at the emergency departments, which caused the patients to experience higher levels of anger.

At emergency departments, patient relatives may get enraged because of the deficiency of treatment or intervention, resulting in violence (21, 22). In line with the literature, 42.4% patients were enraged due to the deficiency of treatment in this study.

This study revealed that 49.2% patients were enraged about the lack of information. Medical personnel working at the emergency department may consider everything in the department as routine. However, nothing is routine for patients as well as their families. Patient families request kindness, good care, confidence, cleanliness, and consideration toward their personal interests from the emergency department team. Therefore, it should be ensured that families are involved in patient care, and they should be given the necessary information and explanations (23).

It was determined that 39.0% patients were enraged about the lack of communication. Similar to this result, in the study conducted by Hahn et al. (24), the failure of sustaining a relationship with different patients/patient relatives increased the level of anger and caused violence.

It is indicated that existing problems of anxious patients and patient relatives in emergency units, as well as the longer waiting times and delays caused by a number of reasons, may cause them to lose patience and lead to an increase in their anger levels. This may result in the display of aggressive tendencies (21). In this study, 57.9% patients were enraged about long waiting times, too. Patients and patient relatives expect the identification and solution of their problems as soon as possible during extensively stressful situations. Increases in the waiting times due to various reasons may cause the patients and patient relatives to experience increased stress, the ex-

pectations of medical staff can gradually change, and the communication process becomes more problematic. In their study, Boz et al. (25) stated that longer waiting times increased the anger levels of patients/patient relatives, leading them to exhibit violence toward the medical staff.

Similar to the reasons of anger stated in this study, the following facts increase the anger levels of patients/patient relatives and cause medical staff to be exposed to violence. Patient relatives request to be immediately taken care of and they think that their patients are more urgent, waiting rooms are untidy and crowded, registration procedures take a long time, patients and patient relatives have suspicions about the irregular business or injustice regarding inclusions, number of medical staff is insufficient during the busiest time of the day, and the staff displays irrelevance (10, 17, 19, 22, 23, 25).

As a consequence, it is assumed that making the necessary explanations to the patients/patient relatives, providing them with large and comfortable recreation places where they can wait, allowing them to see their patients after certain intervals, facilitating the bureaucratic procedures, increasing the number of medical staff, and making the medical staff approach the patients with an empathetic attitude will increase the satisfaction of the patients/patient relatives admitted to emergency services, meet their expectations, minimize communication problems with patients/patient relatives at the emergency services, and decrease the levels of anger.

Study Limitations

The limitations of this study are that every patient applying to the emergency clinic due to increased patient flow was not included in the study, and the results of the study could be generalized only to the institution where the study was conducted.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Ataturk University School of Medicine (Decision No: 10/05/2013).

Informed Consent: Verbal informed consent was obtained from patients' parents who participated in this study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: No conflict of interest was declared by the authors.

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EURASIAN JOURNAL OF EMERGENCY MEDICINE

Nosocomial Infections and Associated Risk Factors in Geriatric Patients in the Intensive Care Unit

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Abstract

Aim: The elderly population increases worldwide. The purpose of this study was to evaluate nosocomial infections (NI) detected in geriatric patients and to determine the risk factors leading to their development.

Materials and Methods: Patients monitored in our hospital's Intensive Care Unit (ICU) were evaluated daily by intensive care and infectious disease specialists, including surveillance by our Infection Control Committee. We included the patients aged ≥65 years who were monitored in the adult ICU between January and December 2014, using the methods of retrospective file screening and computer record review. Patients were classified into two groups: patients with and without NI.

Results: In total, 222 (38.07%) patients were ≥65 years old. 44 NI events were detected in 27 patients. Groups were compared with respect to age; sex; presence of mechanic ventilation (MV), central venous catheterization (CVC), cerebrovascular disease, chronic obstructive disease, diabetes mellitus; and mortality. The presence of MV, CVC, and mortality were seen to be significantly higher in patients with NI compared with those without. The most common NIs found were sepsis and pneumonia. The most common infectious agent was Acinetobacter.

Conclusion: NIs observed in hospital ICUs are common, but largely preventable, conditions. A systematic approach and well-disciplined empiric therapy are very important. Our study revealed that the mortality rate is high in elderly patients who develop NI, and NI is more commonly seen in patients who undergo invasive interventions. We believe that using invasive interventions as little as possible in this group may improve their treatment success and outcome.

Keywords: Nosocomial infections, risk factors, geriatric patients

Introduction

As the elderly population increases worldwide, the evaluation and care of elderly patients becomes very important. With increases in the geriatric population, the number of elderly patients admitted to intensive care units (ICUs) has also increased (1, 2).

The courses of elderly patients in ICUs may differ. Elderly patients in ICUs represent a complex patient group; they may have acute exacerbations of underlying chronic diseases or problems involving many organ systems. Acute exacerbations of a chronic disease can become more complex because of the general decline in physiological reserves that comes with advanced age. Patients over 65 years of age account for 42%-52% of those in ICUs in the USA (3-5).

Nosocomial infections (NI) are an important health issue, both globally and in Turkey, because of their economic burden and high mortality rates. A decrease in the rates of NI has been achieved in developed countries as a result of infection control studies initiated earlier by these countries. Detection of problems has been delayed in developing countries because of their lag in initiating such studies. Developing countries have a 2-20-fold higher risk of NIs compared with developed countries (6, 7).

Despite the fact that elderly patients are at higher risk for developing NIs, the frequency, risk factors, and types of hospital-acquired infections in geriatric patients are not well known (8, 9).

The purpose of this study was to evaluate NIs detected in geriatric patients and to determine the risk factors leading to their development.

This study was presented at the 7th Eurasian Congress of Infectious Diseases (EACID), 30 September-3 October, 2015, Tbilisi, Georgia.

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Materials and methods

This study was conducted between January 1 and December 1, 2014, with the approval of the hospital ethics committee (Kanuni Sultan Suleyman Training and Research Hospital, Ethics Committee Decision No. 164/32, dated November 24, 2014).

Patients monitored in our hospital's ICU were evaluated daily by intensive care and infectious disease specialists, including surveillance by our Infection Control Committee. In this study, we examined the patients aged ≥18 years who were monitored in the adult ICU between January 2014 and December 2014, using the methods of retrospective file screening and computer record review. We focused on the patients aged ≥65 years.

Subjects were classified into two groups: patients with and without NI. Both groups were then compared with respect to the use of mechanical ventilators (MV) and central venous catheters (CVC); the presence of selected types of underlying disease (such as cerebrovascular disease (CVD), chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM); and mortality.

NIs were diagnosed according to the criteria of Centers for Disease Control and Prevention (CDC) in patients who were being monitored by our hospital-based and laboratory-based active surveillance methods.

Cultures of elderly patients detected to have NI were collected from their blood, urine, and site of infection on the day they developed the infection. The number of infections in these patients and the distribution of their infections by body system and causal agents (microorganisms) were recorded.

Identification of the growing microorganisms and antibiotic sensitivity testing of blood cultures were performed using an automated system. The Statistical Package for the Social Sciences version 15.0 (SPSS Inc.; Chicago, IL, USA) program was used for statistical evaluation: mean ± standard deviation, Chi-square tests, and Mann–Whitney U tests were calculated for descriptive statistics and tests of statistical significance. A p-value<0.05 was considered statistically significant.

Results

In our study, 583 patients were admitted to the adult ICU, 222 (38.1%) were ≥65 years old. 44 NI events were detected in 27 patients.

When patients with and without NI were compared with respect to age; sex; presence of MV, CVC, CVD, COPD, DM, and mortality, the presence of MV and CVC and mortality were seen to be significantly higher in patients with NI compared with those without. No differences between study groups were detected in the other examined parameters (Table 1). The most common NIs found were sepsis and pneumonia. The most common infectious agent was Acinetobacter (Table 2).

Discussion

Patients monitored in ICUs are characterized by impaired general health status, frequent exposure to invasive interventions, use of broad-spectrum antibiotics, and longer duration of hospital stays. Infection is one of the most important causes of morbidity and mortality in this setting. Despite the fact that only 5%-10% of hospitalized patients are treated in ICUs, 20%-25% of all NIs occur in these units (10-12).

Table 1. Comparison of characteristics of geriatric patients with and without NI (n/%)

	Patients with NI N=27 (12.2%)	Patients without NI N=195 (87.8%)	P value
Mean age	74.85±9.73 years	76.64±6.86 years	0.113
Sex: M/F	15/12 (55.6/44.4)	75/120 (38.5/61.5)	0.09
Presence of CVC	27 (100)	87 (44.6)	<0.001
Presence of MV	27 (100)	72 (36.9)	<0.001
Presence of COPD	8 (29.6)	58 (29.7)	0.99
Presence of DM	6 (22.2)	60 (30.8)	0.36
Presence of CVD	2 (7.4)	34 (17.4)	0.18
Mortality rate	23 (85.2)	28 (14.4)	<0.001

CVD: cerebrovascular disease; MV: mechanical ventilators; COPD: chronic obstructive pulmonary disease; DM: diabetes mellitus; CVA: central venous catheters; CVC: central venous catheterization; NI: nosocomial infections

Table 2. Number and percent of NIs developed by microorganism (n/%)

	N (%)
Acinetobacter baumannii	16 (36.4)
Pseudomonas species	11 (25)
MRSA + MRCNS	8 (18.2)
Klebsiella pneumoniae	24 (4.6)
Candida albicans	3 (6.8)
Escherichia coli	3 (6.8)
Serratia marcescens	1 (2.3)
Factors	44 (100)

MRSA: methicillin-resistant Staphylococcus aureus; MRCNS: methicillin-resistant coagulase-negative staphylococ; NI: nosocomial infections

In our study, the rate of elderly patients being admitted to the adult ICU was 38.1%. This rate was determined to be 49.8% in a study by Ozdemir et al. (2) and 48.6% in another study (13).

The human lifespan is being extended by new developments, and interventions to extend the lifespan may lead to infections. Hospitalized elderly patients are at high risk of NIs because of the predisposition of underlying chronic diseases, physiological changes of aging, and invasive interventions (14, 15).

Our study revealed that the presence of CVC and MV was significantly higher in patients with NI than in those without; but no difference was detected in other examined parameters. Our study also revealed that the mortality rate was statistically significant and higher in patients who developed NI compared with those who did not.

In another Turkish study conducted with 433 patients, of whom 288 were >65 years of age, the presence of MV and CVC and the use of broad-spectrum antibiotics were found to be higher in elderly patients who developed NI compared with those who did not. No associations were detected between the presence of DM, malignancy, or COPD and the development of NI (2).

Similar to our findings, a study by Ribas and Gontijo Filho (9) also reported that the presence of CVC and MV was higher in elderly pa-

Table 3. The most common infections and microorganisms observed in selected studies on NI (%)

Study	Year	Age group	Most common infection	Most common microorganisms
Beaujean et al. (19)	1997	Geriatric	UTI	-
Stéphan et al. (17)	2001	>75 years	Pneumonia	-
Ribas et al. (9)	2003	≥65 years	Surgical site	-
Erbay et al. (16)	2003	Adults	Pneumonia	*Pseudomonas aeruginosa*
Ellidokuz et al. (20)	2003	≥65 years	Surgical site	-
Ozdemir et al. (2)	2012	≥65 years	Pneumonia	-
Oberoi et al. (21)	2012	≥65 years	UTI	*Escherichia coli*
Mythri et al. (15)	2014	43–72 years	UTI	-
Erdem et al. (18)	2014	Adults	Pneumonia	Acinetobacter species
Present study	2014	≥65 years	Pneumonia	Acinetobacter species

UTI: urinary tract infection; NI: nosocomial infections

tients who developed NI. A study by Mythri et al. (15) revealed that NIs in elderly patients were associated with invasive interventions.

A study by Erbay et al. (16) reported a mortality rate of 60.9% for patients with NI and 22.1% for those without, which was a statistically significant finding (16). However, a study by Stéphan et al. (17) reported that patients over 75 years of age were not at an increased risk of NI development or death.

According to the literature, NI in elderly patients commonly involves pneumonia and Acinetobacter. Summary findings of selected studies related to this issue are listed in Table 3.

A study by Aydemir et al. (22), which was also conducted in Turkey, examined infection consultations for elderly patients and reported the most common diagnoses as community-acquired pneumonia, nosocomial pneumonia, and urinary tract infection.

Nosocomial pneumonia developed in an ICU setting increases morbidity and mortality (2). In a study by Alp et al. (23), the mortality rate was reported to be 65% for the nosocomial pneumonia group and 26% for the control group; whereas the study of Pancharti et al. (24) reported the mortality rate for the nosocomial pneumonia group to be 42%

A study by Cevik et al. (25), conducted in a neurological ICU, reported a mortality rate of 69% for NI and demonstrated that MV, use of steroids, parenteral nutrition, and a low score on the Glasgow Coma Scale heightened mortality.

We believe that the high mortality rate of 85% in our study may be attributed to the fact that all NIs occurring in our geriatric patients were pneumonia and sepsis, and the rates of MV and CVC were very high.

Conclusion

NIs observed in hospital ICUs are common, but largely preventable, conditions. A systematic approach and well-disciplined empiric therapy are very important. Our study revealed that the mortality rate is high in elderly patients who develop NI, and NI is more commonly seen in patients who undergo invasive interventions. We believe that using invasive interventions as little as possible in this group may improve their treatment success and outcome.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Kanuni Sultan Süleyman Training and Research Hospital (24.11.2014, Decision No: 164/32).

Informed Consent: Informed consent was not received due to the retrospective nature of the study.

Peer-review: Externally peer-reviewed.

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Burnout and Empathic Tendency Levels in Emergency Nurses

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Abstract

Aim: It is important to determine the factors affecting burnout and empathic tendency levels among emergency nurses in order to increase satisfaction with healthcare service in patients and their relatives and to increase the quality of healthcare services. The purpose of the present study was to determine the factors that affect burnout and empathic tendency levels among emergency nurses.

Material and Methods: This was a descriptive and cross-sectional study. Data were collected using the Nurse Identification Form, the Maslach Burnout Inventory (MBI), and the Empathic Tendency Scale (ETS).

Results: A total of 129 emergency nurses participated in the study. Among the nurses, 22.5% were males. The mean MBI score of nurses who partially willingly chose the profession, did not like their job, and had poor or very poor quality of work life was found to be higher. The mean ETS score of nurses who willingly or partially willingly chose the profession and who liked their job was higher.

Conclusion: Because empathic skills and tendency can be improved with education, the empathic tendency skills of nurses should be improved through continuous education programs.

Keywords: Emergency nursing, empathic tendency, maslach burnout inventory, self-awareness

Introduction

In the healthcare system, burnout is a frequent problem in professions, particularly in nursing, where services are directly provided to individuals. Burnout has a personal nature, but it can lead to the loss of professional productivity, challenges in under taking professional responsibilities, and loss of institutional efficiency (1-4). Maslach defined burnout "as a syndrome seen in individuals who are exposed to intense emotional demands due to their occupation and are asked to work face-to-face with other individuals, which is caused by fatigue, long-term exhaustion, hopelessness, and desperate feelings being reflected out with negative behaviors shown toward occupation, life, and other people" (5).

Emergency services in Turkey have very stressful and exhausting environments because simultaneous care is provided to patients with various health problems and critical decisions need to be made in a short time (2). Compared with other clinics of hospitals, emergency services are very crowded places where unplanned visits need to be made and various duties ranging from non-emergency procedures to resuscitation are performed (6). Additional factors such as the excessive number of patients, limited number of nurses, long working hours, shift work, provision of care for patients in need of extensive and immediate care, emotional stress linked to working conditions, insufficient wages, lack of appreciation by executives, and lack of support from colleagues may lead to exhaustion in emergency healthcare professionals, particularly in nurses (7-10).Accordingly, previous studies have reported that emergency nurses are more likely to experience burnout due to emotional exhaustion, depersonalization, and job-related stress because they face more challenging and life-threatening situations than nurses working in other services (1,9, 11,12).

Work-related burnout may negatively affect nurses' understanding of and communication with patients and relatives, which in turn may result in not being fully able to meet patients' needs. Ultimately,

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this may result in reduced empathic tendencies in nurses. Empathic tendency, which makes up the emotional dimension of empathy, is defined as the ability to understand the emotional problems of individuals and the desire to help individuals who have such problems (13, 14). Empathic tendency is one of the professional qualities nurses need to possess; however, the level of burnout can negatively affect the use of this quality. In this regard, it is very important to determine the factors affecting the burnout and empathic tendency levels of emergency nurses in order to increase satisfaction with healthcare service in patients and their relatives and to increase the quality of healthcare services.

Material and Methods

Study design

This descriptive and cross-sectional study aimed to determine the factors that affect the burnout and empathic tendency levels of emergency nurses. The study was conducted between May 1 and May 28, 2016. The sample was obtained from a group of 136 nurses who were working at the emergency services of 5 public hospitals and a university hospital. A total of 129 nurses who volunteered to participate in the study and who worked at an emergency service during the past 6 months were recruited. Nurses who were on leave or excused on the day the questionnaires were administered, who did not agree to participate in the study, and who did not complete the questionnaires were excluded from the study (n=7). The response rate in the present study was 94.9%.

The research questions of the present study, which recruited emergency nurses, were as follows: (1) What are the sociodemographic and professional characteristics of emergency nurses? (2) What is the level of burnout and empathic tendency in emergency nurses? (3) Do the sociodemographic and professional characteristics of emergency nurses affect their levels of burnout and empathic tendency? (4) Is there an association between burnout and empathic tendency in emergency nurses?

Data were collected using the Nurse Identification Form, the Maslach Burnout Inventory (MBI), and the Empathic Tendency Scale (ETS). The Nurse Identification Form consists of 33 questions on sociodemographic and occupational characteristics. MBI was developed by Maslach and Jackson in order to determine the "Emotional Exhaustion,""Depersonalization," and "Personal Accomplishment" levels of individuals with regard to their occupation (5). Ergin conducted the Turkish validity and reliability study of MBI in Turkish nurses (15). MBI contains 22 items and 3 sub-dimensions titled Emotional Exhaustion, Depersonalization, and Personal Accomplishment. Responses for each item are rated as "0=Never," "1=Very rarely," "2=Sometimes," "3=Often," and "4=Always." Total scores can range between 0 and 88. Higher scores indicate higher levels of burnout.

Empathic Tendency Scale is a Likert-type scale developed by Dökmen (16) in order to measure the empathic tendencies of individuals. ETS consists of 20 items scored by the respondents on the basis of the level of agreement on a scale ranging from 1 to 5. In reverse scored items, a score of 1 corresponds to the statement "I completely agree" and a score of 5 corresponds to "I completely disagree". Higher scores indicate higher empathic tendency levels.

In a pilot study, the survey form was tested on 5 nurses. Data obtained from the pilot study were not included in the actual study. The participants were informed about the study, and written informed consent was obtained before data collection. It was explained that participation in the study was voluntary, that personal information such as one's name should not be written on the questionnaires, and that findings of the study will only be used for research purposes. It took approximately 10–12 minutes to complete the survey form. Permission to conduct the study was obtained from the Ethics Committee of the Ondokuz Mayis University (04.14.2016, Decision No: B.30.2.ODM.020.08/234-299). Additional permissions were also taken from hospital executives and the university hospital management. In the present study, the Cronbach alpha coefficients of MBI and ETS were found to be 0.76 and 0.59, respectively.

Statistical analysis

Data were analyzed using the Statistical Package of Social Sciences version 21 (IBM SPSS Statistics; Armonk, NY, USA) software. Normality was examined using the Shapiro-Wilk method. The Mann-Whitney U and Kruskal-Wallis tests were conducted to analyze non-normally distributed data, whereas the independent samples t-test and 1-way analysis of variance (ANOVA) were used to analyze normally distributed data. Reliability of the scales was measured with Cronbach alpha analysis. The associations between scale scores were examined using Spearman's correlation coefficient. Results were presented as frequencies, percentages, means, standard deviations, and medians (minimum-maximum). The level of statistical significance was accepted as $p<0.05$.

Results

A total of 129 emergency nurses participated in the present study. It was found that 77.5% of the participants were females, 22.5% were males, 62.8% were married, 38% had associate degrees, 31% had Bachelor's degrees, 77.5% were on the permanent staff, 92.2% were service nurses, 80.6% worked continuous shifts, 42.6% were partially satisfied with working in the emergency service, and 39.5% defined their job satisfaction level as average (Table 1).

The mean MBI score was 44, and the mean Emotional Exhaustion, Depersonalization and Personal Accomplishment sub-dimension scores of MBI were 19, 6, and 19, respectively (Table 2). It was determined that the mean MBI scores showed significant differences according to willingly choosing the profession ($p<0.001$, $\chi^2=16.056$),liking the job ($p<0.001$, $\chi^2=21.811$), and quality of work life ($p<0,001$, $\chi^2=18,744$), while the mean MBI scores did not show significant differences according to age($p=0.264$, $\chi^2=3.977$), marital status ($p=0.411$, $U=1775.5$), gender ($p=0.901$, $U=1430$), education level ($p=0.964$, $\chi^2=0.276$), employment status ($p=0.191$, $U=1218.5$), assignment in the emergency service ($p=0.937$, $U=586$), work schedule ($p=0.620$, $U=1217$), and employee satisfaction in the emergency service ($p=0.181$, $\chi^2=3.422$). In light of these findings, it can be said that the mean MBI scores of nurses who partially willingly chose the profession, were dissatisfied with their job, and had poor or very poor quality of work life were higher (Table 3).

The mean ETS score was determined as 73.96±9.80 (Table 2). It was found that the mean ETS score showed significant differences according to willingly choosing the profession ($p=0.981$, $\chi^2= 0.0038$) and liking the job ($p=0.046$, $\chi^2=6.177$), while the mean ETS score did not show significant differences according to age ($p=0.865$, $\chi^2=0.650$), marital status ($p=0.536$, $U=1817$), gender ($p=0.101$, $U=1160$), education level ($p=0.964$, $\chi^2= 0.276$), employment status ($p=0.285$, $t=1.070$), assignment in the emergency service ($p= 0.729$,

Table 1. Distribution of sociodemographic and professional characteristics of nurses

Characteristics		**n**	**%**
Age groups (30.47±7.62)	18–24 years	40	31.0
	25–31 years	26	20.2
	32–38 years	43	33.3
	39–46 years	20	15.5
Gender	Female	100	77.5
	Male	29	22.5
Marital status	Married	81	62.8
	Single	48	37.2
Education level	Vocational high school	33	25.6
	Associate degree	49	38.0
	Undergraduate	40	31.0
	Bachelor's degree	7	5.4
Employment status	On permanent staff	100	77.5
	Contracted	29	22.5
Assignment in emergency service	Service nurse	119	92.2
	Service chief nurse	10	7.8
Work schedule	Day work	25	19.4
	Night shift	104	80.6
Employee satisfaction	Satisfied	53	41.1
	Not satisfied	21	16.3
	Partially satisfied	55	42.6
Job satisfaction	Very good	7	5.4
	Good	33	25.6
	Moderate	51	39.5
	Poor	16	12.4
	Very poor	22	17.1

Table 2. Means and standard deviations of MBI and ETS scores

	AM±SD
Emphatic Tendency Scale	73.96 ± 9.80
Maslach Burnout Inventory	44 (23-84)
Maslach Burnout Inventory Sub-dimensions	
Emotional Exhaustion	19 (9-26)
Depersonalization	6 (0-19)
Personal Accomplishment	19 (6-26)
A.M: arithmetic mean; SD: standard deviation	

t=−0.348), work schedule (p=0.857, t=0.180), employee satisfaction in the emergency service(p=0.05, F=3.158), and quality of work life (p=0.463, χ^2=2.569). In light of these findings, the mean ETS score was determined to be higher in nurses who willingly or partially willingly chose the profession and who liked their job (Table 3).

Discussion

Emergency services are very hectic, intense, and stressful working environments where lives are saved and patients in need of immediate assistance are assessed and provided with appropriate care. Therefore, healthcare personnel working at emergency services are more likely to develop burnout (9).

In the present study, the mean MBI score was 44 and the mean Emotional Exhaustion, Depersonalization, and Personal Accomplishment sub-dimension scores of MBI were 19, 6, and 19, respectively. In other studies examining the burnout levels of nurses and related factors, it was reported that nurses scored between 7.21±6.74 and 33.67±10.82 on the Emotional Exhaustion sub-dimension, 2.81±3.35 and13.67±7.26 on the Depersonalization sub-dimension, and 11.6±4.7 and 36.80±7.91 on the Personal Accomplishment sub-dimension (4, 9, 17-24). Previous studies have provided inconsistent results regarding the MBI total and sub-dimension scores among nurses. This inconsistency may be explained by the differences in the sociodemographic and occupational characteristics of nurse samples, including age, gender, marital status, working conditions, work load, working hours, work schedule, and professional experience.

In the present study, it was determined that the mean MBI scores were significantly higher in nurses who partially willingly chose the profession, disliked their job, and had very poor or poor quality of work life. Previous studies have supported our findings and reported that age (18, 23), gender (23), education level (18, 23), marital status (18, 23), work schedule (18, 23), and duties (23) do not affect burnout levels of nurses. On the other hand, other studies with contradicting results have indicated that age, gender, marital status, education level, income, family structure, childbearing status, employment duration, satisfaction with wages, shift work, daily and monthly working hours, overtime work, and workplace relationships are associated with the Emotional Exhaustion and Depersonalization sub-dimensions of MBI (2-4, 9, 17-26).

Factors that affect burnout levels in nurses may vary according to methodology. Nevertheless, a number of studies have demonstrated that voluntary occupational choices, satisfaction with professional life, education level, and income affect burnout levels (17, 19, 24). In addition, it has been reported that women suffer more from emotional exhaustion than men; that personal perceptions, emotional exhaustion, and depersonalization levels of nurses who work shifts are generally higher; and that depersonalization reduces with increased employment duration (22). In the same study, it was found that gender is not associated with burnout in nurses, while other studies (22, 24) indicated that gender is an important variable affecting MBI scores. This inconsistency in the literature can be explained by the fact that there is a high number of female nurses who constitute the majority of study samples and that there is only a small number of male emergency nurses. Furthermore, the choice of occupation seems to be an important factor that can negatively affect burnout levels among nurses as well as one's personal and work life. An individual who willingly practices his/her profession would have higher levels of job satisfaction and perceived success, which in turn reduce burnout levels.

In the present study, it was determined that age and professional experience did not affect burnout levels. However, in a previous study, it was found that the burnout level reduces with increased age and professional experience and that younger and less experienced

Table 3. Comparison of MBI and ETS scores according to sociodemographic and professional characteristics

		Empathic Tendency Scale		Maslach Burnout Inventory	
		Med (Min-Max) AM±SD	p Value Test Value	Med (Min–Max)	p Value Test Value
Age	18-24 years	73.5 (53-100)	p=0.865 χ2=0.650	43.5 (28-63)	χ2=3.977 p=0.264
	25-31 years	73 (56-88)		47.5 (23-84)	
	32-38 years	74 (53-98)		45 (30-62)	
	39-46 years	76.5 (56-100)		42.5 (27-50)	
Marital status	Married	74 (53-100)	p=0.536 U=1817	45 (27-84)	U=1775.5 p=0.411
	Single	73.5 (54-100)		44 (23-63)	
Gender	Female	74 (53-100)	p=0.101 U=1160	44 (23-84)	U=1430 p=0.901
	Male	72 (56-85)		44 (27-55)	
Education level	Medicine career college	74 (54-100)	p=0.964 χ2=0.276	41 (23-58)	χ2=0.276 p=0.964
	Associate degree	74 (53-93)		44 (28-63)	
	Undergraduate	73.5 (53-100)		46 (30-84)	
	Bachelor's degree	70 (56-84)		49 (38-58)	
Employment status	Staffed	74.46±10.07	p=0.285 t=1.070	44.5 (27-84)	U=1218.5 p=0.191
	Contracted	72.24±8.76		44 (23-63)	
Assignment in emergency service	Service nurse	73.87±9.96	p=0.729 t=−0.348	44 (23-84)	U=586 p=0.937
	Service chief nurse	75.00±8.00		44 (36-53)	
Work schedule	Day work	74.28±9.11	p=0.857 t=0.180	44 (28-53)	U=1217 p=0.620
	Night shift	73.88±10.00		44 (23-84)	
Employee satisfaction	Satisfied	75.43±10.87	p=0.05 F=3.158	43 (23-63)	χ2=3,422 p=0.181
	Not satisfied	73.43±10.75		44 (28-84)	
	Partially satisfied	72.75±8.22		46 (30-59)B	
Willingness in choice of profession	Willingly	74(53-100)	p=0.981 χ2=0.0038	43 (23-62)A	χ2=16.056 p<0.001
	Partially willingly	74 (53-100)		47 (30-59)B	
	Unwillingly	72.5 (56-98)		47.5 (34-84)AB	
Status of liking the Job	Likes	74.50 (53-100)	p=0.046 χ2=6.177	42 (23-66)A	χ2=21.811 p<0.001
	Dislikes	69 (56-88)		48 (38-63)B	
	Indecisive	74 (53-100)		46 (27-84)AB	
Quality of worklife	Very good	73.5 (53-79)	p=0.463 χ2=2.569	42 (25-55)AB	χ2=18.744 p<0.001
	Good	75 (53-79)		43 (23-63)A	
	Poor	72 (54-100)		47 (30-84)B	
	Very poor	73 (53-93)		49 (40-59)B	

AM: arithmetic mean; SD: standard deviation; F: 1-way variance analysis test statistic; χ2: Kruskal-Wallis test statistic; t: Independent samples t-test statistic; U: Mann-Whitney U test statistic; A-B: there is no difference between groups of the same letter

nurses have higher burnout levels (27). Other relevant studies have reported that the problem solving skills of nurses improve with age and increased experience (3) and that nurses who do not find their job to be suitable for them and who are dissatisfied with their work life have higher burnout levels (17).

In the present study, the mean ETS score was found to be 73.96±9.80. In a study by Özcan (28), which investigated factors related to the empathic tendency and skills of nurses, the mean ETS score was reported to be 65.95±10.66. In another study conducted for determining the association between empathy and job satisfaction in nurses working at a university hospital, the mean ETS score was found to be101.33±14.07 (10). In a study by Köksal and Üstün (20), which examined the relationship between empathic tendency and burnout in nurses, the mean ETS score was reported to be 69.95±7.89.In conclusion, mean ETS scores vary across studies. This variation may be linked to numerous sociodemographic and profes-

sional characteristics of nurse samples, such as age, gender, marital status, work load, working hours, work schedule, insufficient nursing staff, personal features, and education level.

It was determined that willingly choosing the nursing profession and liking the profession affected ETS scores and that nurses who willingly or partially willingly chose the profession and those who liked their job had higher ETS scores. On the other hand, it was demonstrated that ETS scores did not show significant differences according to age, marital status, gender, education level, employment status, assignment to the emergency service, type of employment, satisfaction with working at the emergency service, quality of work life, and job satisfaction.

Previous studies that support our findings have shown that age, marital status, gender, education level, employment status, employment duration, and satisfaction with the working environment do not affect ETS scores in nurses (10, 28, 29). However, other studies have indicated that gender, education level, work unit, assignment, and weekly working hours affect nurses' communication and empathic skills (29, 30). It has also been reported that the ETS scores are higher among nurses who are married and have children, who are health high school graduates, and who have a working duration of 10 years and more at the current unit (10, 28). Lastly they drew attention to the plausibility that high empathic tendencies can lead to burnout, even though no relation was found in between the two in this research (31). Finally, the present study showed that there was no association between empathic tendency and gender. This finding can be explained by the fact that male nurses adopt an empathic approach toward their patients, similar to female nurses.

Study limitations

In the present study, data were collected using self-report burnout and empathic tendency questionnaires. Empathic tendency and burnout levels of nurses were not evaluated through observations and repeated measures, which is an important limitation of the present study. Thus, it is recommended that future studies should employ qualitative research methods as well as quantitative methods such as carrying out focus groups with nurses.

Conclusion

In the present study, it was determined that nurses who partially willingly chose the profession, disliked their jobs, and had poor or very poor quality of work life had higher burnout levels, while nurses who willingly or partially willingly chose the profession and who liked their jobs had higher empathic tendency levels. It is recommended that personal and work-related factors, which affect empathic tendency and burnout in nurses, should be addressed and that the effects of working conditions on nurses should be periodically evaluated by executives. In addition, patient loads should be reduced and working conditions as well as the physical working environment should be improved. Finally, it is of crucial importance to include the topic of empathic tendency in nursing education and in graduate continuous education programs.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Ondokuz Mayıs University School of Medicine (04.14.2016, Decision No: B.30.2.ODM.020.08/234-299).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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The Safe Use of Sharps and Needlestick among Nurses Working in Surgical Clinics, Turkey

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Abstract

Aim: The purpose of this study was to determine the attitude of nurses working in surgical clinics regarding the safe use of sharps and towards needlestick injuries.

Materials and Methods: This cross sectional descriptive study was conducted between December 2013 and February 2014 in the surgical clinics of research hospitals located in three cities within Turkey. A 54-item questionnaire consisting of 5 categories was used as the research tool. On the questionnaire was completed by 360 surgical staff nurses who agreed to participate in the study and were not on sick leave or off duty (participation rate was 88.2%).

Results: The mean score obtained from nurses using the Turkish version of the "scale of medical staff's attitude regarding the safe use of sharps and needlestick" questionnaire was 108.64±11.30. It was also determined that 46.1% of the nurses were injured 1-5 time(s) a year; 40.6% had needlestick, 32.5% were injured with broken ampoule pieces, 54.4% were vaccinated against hepatitis and tetanus; and 63.0% had knowledge about the activities of the infection control committee.

Conclusions: Because of the high level of sharps and needlestick injuries, the following can be recommended: routinely conducting serological tests of the personnel routinely, change the submission of annual assessment reports into an institutional policy, and offer in-service training programs periodically.

Keywords: Surgical clinic, sharps, needlestick, injury, nurses

Introduction

Medical services have many risk factors that adversely affect the health of hospital personnel in particular (1). In a study conducted in 2004, Sharp and needlestick injuries are the main occupational accidents and risks that medical personnel are exposed to at a rate of 80% (2).

Sharp and needlestick injuries refer to medical or laboratory materials that can cause skin penetration injuries when held. Needles, pointed intravenous intervention tools, bistouries, injectors, and broken pipette or ampoule glass pieces all belong to this category. Additionally, solid plastic materials that can cause injury are also regarded among these materials (3). The most commonly encountered problems in work, in terms of infections that the medical personnel can catch, are injury through blood-contaminated sharps and needlestick or splattering of infected blood, or body fluids, on the mucosa (4).

In surgical clinics, the working safety of surgical clinic nurses can be affected by reasons such as: an insufficient number of nurses, excessive work load, working in shifts, the emotional stress resulting from of working with individuals with illness, working with patients in need of intensive care and dying patients, disagreements experienced with patients, interpersonal negative relationships, bad physical conditions, institutional policies, and the insufficiency of participation in decision making activities (5, 6). It has been emphasized that the rate of sharp and needlestick injuries, which is generally

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18.1% among nurses, has been at a level of 70%-75% among nurses working in surgical clinics such as surgery rooms and emergency units (7). In another study, it was stated that the rate of sharp and needlestick injuries was 22.8% for nurses, and they were ranked second among healthcare personnel for sharp and needlestick injuries (8). The study of Nsubuga and jaakkola (9) showed a significantly increased risk of needlestick injuries among those who were recapping needles most or all of the time compared to those who were not recapping needles. Despite the known risks, frequency of needlestick injury was generally higher especially among health professionals reflecting bad practices and careless attitudes towards work (10).

The purpose of this study was to analyze the attitudes of nurses working in surgical clinics regarding the safe use of sharps and needlestick injuries.

Materials and Methods

This descriptive study was conducted between December 2013 and February 2014 in the surgical clinics (surgery room, emergency unit, intensive care unit, orthopedics, urology, plastic and reconstructive surgery, eye diseases, otorhinolaryngology, brain surgery, cardiovascular surgery, thoracic surgery, and general surgery)of Atatürk University Medical Faculty Research Hospital (AUMRH), Ankara Yıldırım Beyazıt Training and Research Hospital (AYBH), and Eskişehir Osmangazi Medical School Hospital (EOUTFH).

The study population consisted of 408 nurses working in the surgical clinics of AUMRH, AYBH, and EOUTFH. The study had planned to include all nurses in the study population; however, a total of 360 nurses were included in the study since 22 nurses working in the surgical clinics did not agree to participate in the study and 26 were on leave (participation rate was 88.2%). Written informed consent was obtained from the participants.

Instruments

A "socio-demographic" questionnaire, including introductory information about the nurses, was prepared in accordance with the literature and the "scale of medical staff's attitude regarding the safe use of sharps and needlestick" was used to collect data. Questions regarding the socio-demographic characteristics of nurses, clinics they worked at, frequency of sharps use, frequency of needlestick during work, and the precautions they take were given place in the questionnaire prepared by the researcher in accordance with the literature.

The validity and reliability study of the Turkish version of the "scale of medical staff's attitude regarding the safe use of sharps and needlestick" was conducted by Uzunbayır in 2009 (11). This is a Likert type scale consisting of 5 categories and 54 items that assess the opinions of attitudes of medical personnel regarding the safe use of sharps and of needlestick. The scale includes an equal number of items grouped into behavioral, affective, and cognitive attitudes. A negative ness-positive ness pattern was pursued in the placement of questions: 9behavioral positive items, 9behavioral negative items, 9 affective positive items, 9 affective negative items, 9 cognitive positive items, and 9 cognitive negative items. The scoring of the positive items was as follows: I totally agree (5 points), I agree (4 points), I am indecisive (3 points), I disagree (2 points), I totally disagree (1 point). The reactions given to the negative items are reversely scored. While the lowest score to be received from the scale is 54, the highest score is 270. A low score received from the scale indicates the unsafe use of sharps by the medical personnel; whereas a high score indicates the safe use of sharps by the medical personnel. While the Cronbach's alpha value in the validity study was found to be 0.80 (11), the Cronbach's alpha value was 0.86 in this study.

Procedure

Data from the study were collected by the researcher during the working hours of 08:00-16:00, 16:00-24:00, or 16:00-08:00 as appropriate for nurses during their shift. A face-to-face interview method was used after nurses were informed about the purpose of the study. Verbal permission was obtained. The data collection forms were completed in about 7 minutes.

Data analysis

Data from the study were analyzed in the Statistical Package for the Social Sciences version 15.0 (SPSS Inc.; Chicago, IL, USA) program. Percentage distribution, mean, ANOVA, and t-test were used for assessing the data. Analysis of variance was used for data demonstrating normal distribution and the Kruskal-Wallis test was used for data not demonstrating a normal distribution in comparison of groups in terms of independent variables. When the difference between groups was examined, 0.05 was used as the significance level. While the value of $p<0.05$indicated a significant difference among groups, the value of $p>0.05$ signified no significant difference among groups.

Ethics

Before starting the study, ethics committee approval was received from AUMRH for conducting the study. Afterwards, along with the approval of the ethics committee, the information form including the purpose and scope of the study was submitted to the Head Physician's Office of each Hospital and written permissions were received.

Results

Demographic characteristics of the 360 nurses included in the scope of this study are given in Table 1. 44.2% were within the age range of 26-35 years, 84.2% were female, 48.1% held a bachelor's degree, 45.6% worked at AYBH, 41.1% had0–5 years of total work experience, 55.6% had 0-5 years of experience in surgical clinics, 14.7% currently worked in an emergency service unit, 46.1% had injuries 1-5 time(s) per year, and 63.0% had knowledge about the activities of the infection control committee.

When the distribution of nurses according to their occupational exposure status was assessed (Table 2), it was determined that 40.6% of nurses were injured with injector needles, 3.1% with IV catheters, 7.5% with serum set needles, 11.1% with suture needles, 32.5% with broken ampoule pieces, 0.8% with cautery, and 10.3% with lancet-bistoury. Furthermore, 26.1% were naturally immune, 18.6% were not vaccinated due to neglect, and 54.4% were vaccinated against hepatitis and tetanus.

When mean scale scores of nurses according to their descriptive characteristics were compared (Table 3), it was found that nurses in the age group of 40years and above who held a bachelor's degree , worked at AYBH, and were in the pediatric surgery clinic had higher mean scale scores than the other groups; and the difference between the groups was statistically significant. It was also determined that female nurses had higher mean scores than male nurses, and the dif-

Table 1. Distribution of nurses according to their descriptive characteristics

Descriptive Characteristics	Sample Size	%
Age Groups		
18 – 25 years	119	33.1
26 – 35 years	159	44.2
36 – 40 years	55	15.3
41 years ↑	27	7.5
Gender		
Female	303	84.2
Male	57	15.8
Educational Status		
Bachelor's degree	173	48.1
Medical vocational high school	94	26.1
Associate degree	70	19.4
Postgraduate	23	6.4
Institution the nurse works in		
AYBH	164	45.6
EOUTFH	120	33.3
AUMRH	76	21.1
Years of working		
0 – 5 years	148	41.1
6 – 11 years	97	26.9
12 – 17 years	52	14.4
18 – 23 years	32	8.9
24 years and above	31	8.6
Years of working in the surgical clinic		
0 – 5 years	200	55.6
6 – 11 years	84	23.3
12 – 17 years	34	9.4
18 – 23 years	24	6.7
24 years and above	18	5.0
Clinic the nurse currently works in		
Emergency service	53	14.7
Surgery room	51	14.2
Eye-Otorhinolaryngology	50	13.9
General surgery	40	11.1
Neurosurgery	37	10.3
Orthopedics	33	9.2
Urology	32	8.9
Cardiovascular-thoracic surgery	28	7.8
Pediatric surgery	20	5.6
Plastic surgery	16	4.4
Number of injuries per year		
No injuries	160	44.4
1 – 5 time(s)	166	46.1
6 – 11 times	15	4.2
12 times and above	19	5.3
Infection Control Committee		
I have knowledge about their activities	227	63.0
I do not have knowledge about their activities	133	37.0
TOTAL	360	100.0

AYBH: Ankara Yıldırım Beyazıt Training and Research Hospital; EOUTFH: Eskişehir Osmangazi Medical Faculty Hospital; AUMRH: University Medical Faculty Research Hospital

Table 2. Distribution of nurses according to their occupational exposure status

Injury factor	Number of Injured Nurses	%
• Injector needles	146	40.6
• Broken ampoule pieces	117	32.5
• Suture needle	40	11.1
• Lancet-bistoury	37	10.3
• Serum set needle	27	7.5
• Inserting IV catheter	11	3.1
• Cautery	3	0.8
Vaccination status	**Number of Nurses**	
• Vaccinated against hepatitis and tetanus	196	54.4
• Natural immunity	94	26.1
• Being negligent	67	18.6

ference between mean scores was found to be statistically significant (p=0.32). Those who had been working in the surgical clinics for a period of 24 years or more had higher mean scale scores than the other groups, and the difference between the groups was not statistically significant (p=0.98). Those who had injuries 12 or more times had lower mean scale scores, and the difference between the groups was statistically significant (p=0.02). Nurses who had knowledge about the activities of the Infection Control Committee had lower mean scale scores compared to those who did not, and the difference between the mean scores was not statistically significant (p=0.18).

The scale's Cronbach's Alpha internal consistency coefficient was0.86 in this study (Table 4).

Discussion

It has been observed that personnel tend not to report injuries, tend to not receive medical help, they do not have sufficient knowledge, or even if they have knowledge, do not take sufficient universal precautions (12). The reasons behind why nurses do not report such

Table 3. Comparison of total mean scale scores of nurses according to their descriptive characteristics

	n	Mean Scores Received from Scale X±SS*	Significance
Age Groups			
18 – 25 years	119	106.72±12.44	
26 – 35 years	159	110.32±10.63	KWU=3.08
36 – 40 years	55	106.95±10.87	p=0.03
40 years and above	27	110.70±9.29	
Gender			
Female	303	108.90±11.10	t=1.82
Male	57	107.28±12.37	p=0.32
Educational status			
Bachelor's degree	173	110.53±9.94	
Medical vocational high school	94	105.30±12.65	KWU=4.51
Associate degree	70	108.33±11.92	p=0.00
Postgraduate	23	109.08±10.70	
Institution the nurse works in			
***AYBH	164	110.28±0.88	F=3.40
**EOUTFH	120	107.68±1.02	p=0.04
* AUMRH	76	106.63±1.27	
Years of working			
0 – 5 years	148	107.71±11.74	
6 – 11 years	97	109.33±12.16	F=0.90
12 – 17 years	52	107.76±11.05	p=0.46
18 – 23 years	32	109.84±8.44	
24 years and above	31	111.19±9.17	
Years of working in the surgical clinic			
0 – 5 years	200	108.67±0.82	
6 – 11 years	84	108.18±1.29	
12 – 17 years	34	108.35±2.04	KWU=0.44
18 – 23 years	24	108.75±1.74	p=0.98
24 years and above	18	110.77±1.63	
Clinic the nurse currently works in			
Emergency service	53	108.26±1.40	
Surgery room	51	109.80±1.54	
Eye- Otorhinolaryngology	50	105.18±1.82	
General surgery	40	110.82±1.62	KWU=38.62
Neurosurgery	37	113.81±1.34	p=0.00
Orthopedics	33	103.00±2.19	
Urology	32	106.03±2.20	
Cardiovascular- thoracic surgery	28	107.50±2.15	
Pediatric surgery	20	117.20±1.63	
Plastic surgery	16	107.81±1.58	
Number of injuries per year			
No injury	160	110.43±0.84	
1 – 5 time(s)	166	106.95±0.90	KWU=9.78
6- – 11 times	15	111.73±2.36	p=0.02
12 times and above	19	106.00±2.82	
Infection Control Committee			
I have knowledge about their practices	227	109.45±10.87	t=1.79
I do not have knowledge about their practices	133	107.27±11.94	p=0.18

X±SS*: mean scale score ± standard deviation; AYBH: Ankara Yıldırım Beyazıt Training and Research Hospital; EOUTFH: Eskişehir Osmangazi Medical Faculty Hospital; AUMRH: University Medical Faculty Research Hospital

When mean scale scores of nurses were assessed (Table 4), it was determined that the minimum score received from the scale was 71, the maximum score was 125, and the mean score received from the scale was 108.64±11.30.

Table 4. Mean scale scores of nurses

Total Scale Score	Min–Max. Score Received from Scale	Mean Scores Received from Scale X±SS	Cronbach's Alpha of the Scale
	71 – 125	108.64±11.30	0.86

events could be that the patient was not an at-risk case, the infected tool was not used on the patient, the nurse had immunity, the nurse was too busy, there was no need to interfere, and the reporting system was thought to be a waste of time. In this study, it was determined that 37% of nurses were not aware of the practices of the infection control committees of the institutions they work for (Table 1). In a study conducted with the purpose of providing a program for the avoidance of sharp and needlestick injuries and occupational safety, it was determined that 57% of medical personnel knew which unit they should report to in case of a sharp and needlestick injury (13). In a study conducted to investigate the frequency of occupational accidents among nurses working in a training hospital, when the reasons for not reporting occupational accidents were examined, the most common answers were found to be: not thinking that reporting would be important (27.3%), absence of a procedure in the hospital to report occupational accidents (27.3%), and not knowing that reporting the incident was required (24.2%) (14).

In this study, the most common cause of sharp and needlestick injuries was injuries due to injector needles (40.6%), and injuries caused by broken ampoule pieces ranked second (32.5%), (Table 2).Injuries caused by injector needles among nurses constitute the most commonly encountered occupational injuries with a wide range from 60%–90%(12). In a study, it was reported that 51.9% of nurses were exposed to injury with a pointed tool and 80.4% of this contact happened through an injector (15). According to the literature, 32% of percutaneous injuries occur with single-use injectors, 19% with suture needles, and 12% with winged steel needles (8). Additionally, it could be asserted that not trying

to insert injector caps after using injectors will decrease the rates of needlestick injuries.

Even though exposure to viral and contagious agents through sharp and needlestick injuries can often be avoided, it continues to be a serious problem (13). In this study, it was determined that the vaccination rates of nurses against exposure to viral and contagious agents are not at the desired level (54.4%) and 18.6% of nurses were negligent about vaccination (Table 2). Since effective protection against viral diseases is vaccination, all medical personnel of institutions providing medical services should be included in vaccination programs. In addition, when it is considered that viral and contagious diseases are spread through blood and infections (in the literature) have been reported to be high as a result of injector needle injuries, the seriousness of the problem is emphasized.

Injuries of medical personnel can occur in every field of work (16). In this study, the mean score of the nurses working in surgical clinics using the "scale of medical staff's attitude regarding the safe use of sharps and needlestick" questionnaire was quite high (Table 4). When an interdisciplinary assessment was performed, it was determined that the mean scale scores of nurses working in pediatric surgery units were significantly higher. In a study conducted by Samancıoğlu (17), where they researched the injuries suffered by nurses working in intensive care units as a result of the use of sharps and needlestick, they reported that these nurses were exposed to a higher level of injury, especially while closing the cover of injectors compared to nurses working in the intensive care units in the internal diseases department. In a study conducted by Akgür (12), the knowledge levels of nurses working in surgical units regarding the use of sharps and needlestick were higher than the knowledge levels of nurses working in emergency units, pediatric departments, and internal disease units. This may be related to the fact that nurses working in surgical units encounter invasive and non-invasive interventions at any moment and they follow the operated patient very attentively in terms of the practices. In the study conducted by Özyiğit et al. (18) to examine the attitudes of healthcare personnel working at a training and research hospital regarding the safe use of sharps, it was found that the mean scores of nurses working in surgical clinics (85.71±7.05) were higher than those working in internal clinics. In the study of Yıldız (19), it was determined that the mean score of healthcare personnel regarding the safe use of medical tools was 114.16±8.59.The results of the present study are similar to results of Özyiğit et al. (18) and Yıldız (19).

Another factor related to protection against sharps and needlestick injuries is the educational levels of nurses. In this study, nurses with a bachelor's degree had significantly higher mean scores compared to nurses who only had high school and associate degrees (Table 3).In a study conducted by Akgür (12), it was similarly reported that nurses who received undergraduate education had higher knowledge levels in terms of the use of sharps. This may be related to the fact that the curriculum received by nurses during their undergraduate education has qualities to improve the professional knowledge and skills (12). Additionally, it could be asserted that professionalization, which could be taught by undergraduate education and gained from experience, could raise awareness concerning taking precautions against injuries. The mean scores obtained from female nurses regarding the safe use of medical tools were higher than male nurses (Table 3). In the study conducted by Yıldız (19) to examine the safe use of sharps by medical personnel, it was found that the mean scores of women were higher than those of men. Furthermore, higher scores could be associated with the fact that women constituted the majority of the sample.

46.1% of the nurses participating in the study were reported to be exposed to injuries caused by sharps and needlestick 1-5 time(s) a year (Table 1). In a study conducted by Altıok (20) on medical personnel taking charge in different healthcare services, they reported the injury rate for the last one year as 79.1%; on the other hand, İncesu (13) reported that 57.8% of the medical personnel within the scope of their study were exposed to injuries caused by sharps and needlestick 6-10 times. Aldem et al. (21) reported that the rate of medical personnel being exposed to sharp and needlestick injuries in the last year was 41.7% and 62.6% of the objects that caused injury were contaminated (13,21). In a study conducted by Akgür (12), it was determined that 37.86% of nurses were exposed to sharp and needlestick injuries more than 7 times. The high rates of sharp and needlestick injuries among medical personnel and the objects contaminated with blood or body fluids lead us to believe that medical personnel are inadequately trained in terms of disposing sharps and are not taking universal safety precautions. This poses a large risk for the spreading of infectious diseases (21).

Study limitations

The results can be generalized only to the institutions of medical personel in which the study was conducted.

Conclusion

It could be asserted that the attitudes of surgical nurses regarding the safe use of sharps are at a good level. When it is considered that their rates of being exposed to sharp and needlestick injuries are high, the following can be recommended: routinely performing serologic tests, changing the submission of annual assessment reports into an institutional policy, determine the factors that cause sharp and needlestick injuries, offer in-service training programs periodically, make in-service trainings comprehensible and suitable to the trainee's level, ensure that precautions are correctly put into practice, and design and distribute informative warning components that specify what the personnel should do after injury and to which unit they should apply.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of Atatürk University Institute of Health Sciences (12/03/2012).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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Changes in Electrocardiogram from Inferior Myocardial Infarction to Anterior Myocardial Infarction

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Abstract

We describe a patient who developed acute chest pain and ST-segment elevation in the inferior leads on electrocardiography. In his control electrocardiography after 15 min, ST-segment elevation was observed in the anterior leads. Cardiac catheterization showed that there was wraparound left anterior descending artery and an occlusion in the proximal region. The occlusion was resolved by typical ballooning. To our knowledge, simultaneous ST elevations in anterior and inferior leads have been reported in the literature; however, in our case, with serial electrocardiographic (ECG) records, we realized that inferior ST-segment elevation altered to anterior ST-segment elevation. This indicates the importance of serial ECG records in emergency departments to explain the mechanism.

Keywords: Myocardial infarction, wrap, anterior, inferior

Introduction

Myocardial infarction (MI) results in necrosis of the myocardial muscle due to the occlusion of coronary arteries. Acute occlusion of the left anterior descending coronary artery (LAD) generally results in ST-segment elevations in precordial leads and reciprocal ST-segment depression in inferior leads (1). However, it is sometimes difficult to correlate electrocardiographic (ECG) findings and the infarct-related region. Here we describe a rare case of simultaneous anterior and inferior MI due to the occlusion of "wrapped LAD."

Case Presentation

A 67-year-old man was admitted to the emergency department with chest and left arm pain. He had primer hypertension for 3 years and he was taking an anti-hypertensive agent but had no history of coronary artery disease. He was not a smoker, and there was no family history of coronary artery disease. His blood pressure was 130/80 mmHg, and his pulse rate was 87 bpm. There were no abnormal findings on physical examination. There were ST-segment elevations in D2, D3, and AVF derivations in his first standard 12-lead ECG (Figure 1), and his troponin and CK-MB levels were 8400 ng/mL (0–100 ng/mL) and 102.6 ng/mL (0–5 ng/mL), respectively. He was referred to the cardiology clinic with inferior MI. Aspirin (300 mg orally), clopidogrel (300 mg orally), and heparin (5000 IU intravenous) were given to the patient. A percutaneous coronary intervention (PCI) procedure was suggested. In his second ECG that was taken after 15 min, ST-segment elevations were observed between V1 and V6 derivations and there were reciprocal ST-segment depressions in D2, D3, and AVF derivations (Figure 2). He then underwent angiography. Wrap around LAD and occlusion of the ostial region of LAD were detected (Figure 3a, b). In addition, there was 30% occlusion of the circumflex artery (Cx). The lesion was crossed with a 3-5 mm soft guide wire and predilated with Cross rail 20×15 mm balloons (Alvimedica, Turkey). Then, a coronary stent was placed. Angiography resulted in TIMI II flow, and intracoronary aggrastat (tirofiban HCL) was given; he was then taken to the coronary care unit his discharge with recovery. The patient was discharged after 5 days, with the prescription of aspirin (100 mg/day), clopidogrel (75 mg/day), bisoprolol fumarat (5 mg/day), perindopril (5 mg/day), and rosuvastatin (40 mg/day).

Written informed consent was obtained from the patient for the publication of this case report and any accompanying images.

This study was presented as a poster at the 1st International Critical Care and Emergency Medicine Congress, 6-8 November 2013, İstanbul, Turkey.

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Discussion

Twelve-lead ECG is a diagnostic tool that generally shows the right localization of MI based on ST elevation and reciprocal depression. Inferior ST elevation is generally indicative of the occlusion of the right coronary artery (2). It may rarely indicate the occlusion of the left coronary artery (LAD) (3). In 15% cases of MI with LAD as the culprit vessel, ST elevation in the inferior leads is observed (4). In a previous study, the efficacy of ECG was evaluated for acute MI of the inferior wall and it was suggested that the results from the interpretation of ECG do not change with angiographic findings, despite rare forms of presentations in inferior ST elevation (3). In the presented case, the first ECG record showed the diagnostic findings of inferior MI; however, after 15 min, the second ECG showed findings of anterior MI. In angiography, wraparound LAD was observed. Changes in ECG findings may be an indicator of anterior wall infarction. However, angiography was necessary to explain the reason for this alteration in ECG.

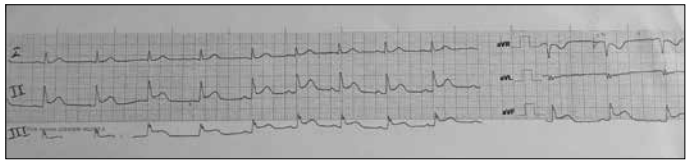

Figure 1. ECG taken during admission
ECG: electrocardiography
Note: We could not obtain chest derivations of the first EKG records

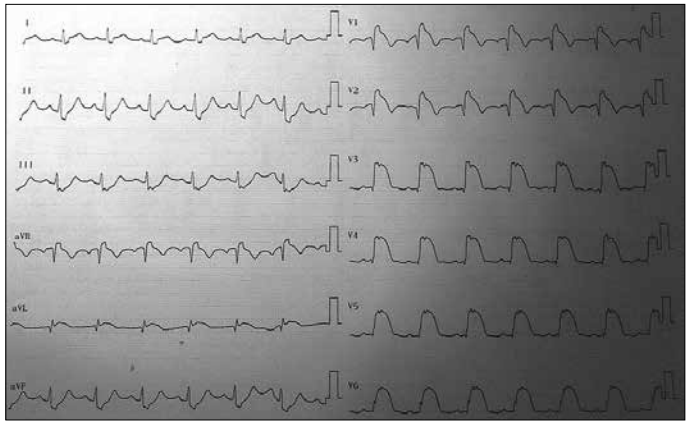

Figure 2. ECG taken after 15 min of admission
ECG: electrocardiography

Wraparound LAD that extends around the cardiac apex can be anatomically observed in the normal population (5). When LAD wraps around the apex, it supplies blood anteriorly and postero-inferiorly to the myocardium. Thus, concomitant ST elevation could be observed and explained by anterior and inferior wall transmural ischemia simultaneously (6). In addition, it can be rarely observed because of significant collateral flow from LAD to the inferior wall (7). It is suggested that the combination of inferior and anterior ST elevation occurs in case of the occlusion of distal LAD to its major branches. In addition, it has been reported that patients who have combined inferior and anterior ST elevation due to wraparound LAD have a better prognosis than those who have anterior ST elevation (7). Similarly, Sadanandan et al. (5) suggested that combined anterior and inferior ST elevation in ECG records is a sign of limited AMI size and the patients have a better prognosis with isolated anterior ST elevation.

In the presented case, the first ECG record was concordant with inferior MI and the second showed anterior MI with reciprocal ST depressions. It may show revascularization of the occlusion of the inferior wall, and then, because of wraparound LAD, transmural ischemia of the anterior wall occurred. It is reported that although transmural ischemia consists of the anterior and inferior wall, ischemia in the inferior wall would disappear because of the force of the injury in the lateral wall (8).

Wraparound LAD caused stenosis of proximal LAD in this case. It is known that the occlusion of proximal LAD has high mortality and morbidity. In the literature, proximal LAD lesions are named as "widow makers" because of their high incidence of mortality (9). However, Sasaki et al. (10) have suggested that if the patient has wrapped LAD and the location of occlusion is proximal to D_1, ST-segments are elevated in the anterior leads and remain within the isoelectric lines in the inferior leads. In our case, ST-segment elevation in the inferior leads was observed before ST-segment elevation in the anterior leads. Ilia et al. (11) have suggested that patients who have anterior ST elevation due to wraparound LAD have a worse prognosis than those who have isolated proximal LAD occlusion. Other factors may affect the severity of clinical outcome. LAD length is one of the important factors (12, 13). There is a relationship between LAD length

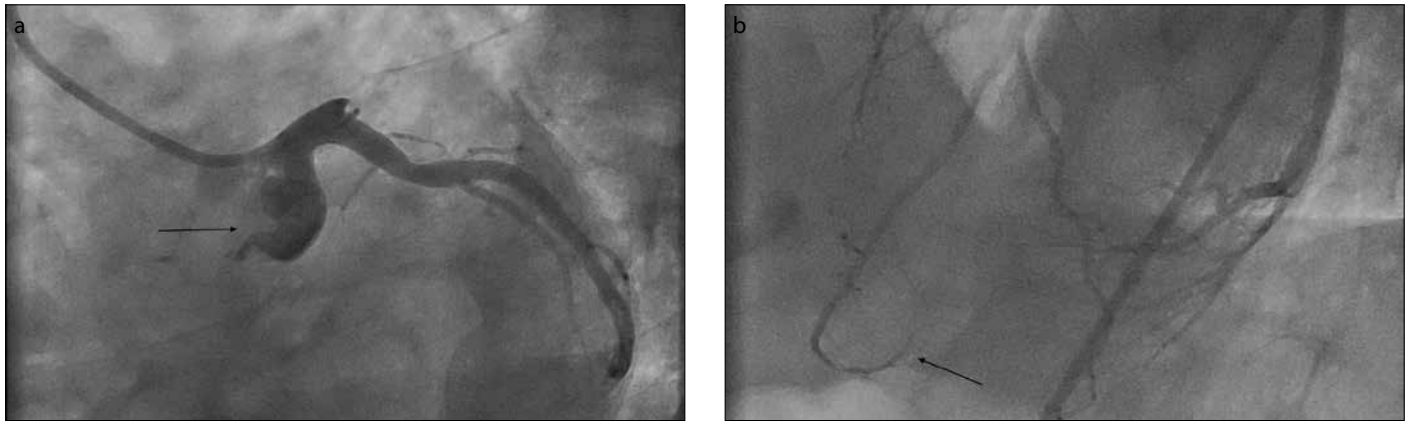

Figure 3. a, b. (a) Occlusion of the ostial region of LAD, (b) Wraparound LAD
LAD: left anterior descending coronary artery

and prognosis. As a result of the greater amount of muscle supplied by a long LAD (in which the vessel wraps around the apex), a greater amount of myocardial necrosis will occur when the vessel occludes. On the other hand, short LADs that do not wrap around the apex have a better prognosis (11).

In the literature, despite conflicts regarding prognosis, simultaneous inferior and anterior ST-segment elevation, due to wraparound LAD, has been reported (5-7, 14, 15). However, there has been an alteration in serial ECG records in the presented case. This indicates the importance of serial ECG records in the emergency department and the efficiency of angiographic findings to explain the mechanism. In addition, it draws attention to wraparound LAD, which can present with unusual ECG records.

Informed Consent: Written informed consent was obtained from patient who participated in this study.

Peer-review: Externally peer-reviewed.

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A Spontaneous Thoracic Spinal Epidural Hematoma Causing Hemiplegia and Back Pain

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Abstract

Spontaneous spinal epidural hematoma (SEH) is an uncommon and emergency condition leading to spinal cord compression. Early diagnosis can be achieved by magnetic resonance imaging (MRI) or computed tomography, but preferably MRI. Surgical decompression is urgent and can relieve neurologic deficits. A 27-year-old man presented to the emergency department with back pain, which began approximately 10 days before. While waiting for the results of biological markers for differential diagnosis, right hemiplegia became evident. Epidural hematoma was revealed with thoracic and lumbar MRI at level T1-T2. Hematoma evacuation and decompression laminectomy was immediately performed.

Keywords: Spinal epidural hematoma, back pain, hypoesthesia

Introduction

Spontaneous spinal epidural hematoma (SEH) is described as a spontaneous collection of blood in the spinal epidural space and often causes devastating sequelae unless it is diagnosed in time and effectively managed. Incidence rate is estimated at 0.1 per 100,000 individuals. Studies show that most cases occur in >40 year-olds (1, 2).

Ethiopathogenesis is usually related to neoplasms, coagulopathy, vascular malformation, traumas, drugs; however, in up to 40% cases, no underlying cause is identified. SEH mostly presents as acute to subacute pain at the level of the spinal hemorrhage, and neurological symptoms may develop including sensory disturbance, progressive weakness, urine and stool retention or incontinence, and paralysis. Atypical SEH may appear as an acute ischemic stroke or myocardial infarction (3). We report a case of thoracic spinal epidural hematoma associated with acute hemiplegia, which was treated with decompression with 100% recovery.

Case Presentation

A 27-year-old man presented to the emergency department with back pain, which began about approximately 10 days before. The patient's temperature was 36.5 C°, heart rate was 68 beats/min, blood pressure was 126/72 mmHg, respiratory rate was 18 breaths/min, and oxygen saturation was 99% on room air. The patient was alert, oriented, and cooperated. The cardiovascular, pulmonary, and abdominal examinations were unremarkable. Examination findings included thoracic and lumbar sensitivity. There was no past medical history or trauma. While waiting for the results of biological parameters for differential diagnosis, right hemiplegia occurred. Weakness in the right leg developed within the first hour following admission. There were no abnormal findings on laboratory or bidirectional lumbar x-ray graphics. Neurological findings of the patient consisted of a normal cranial nervous system with rapid progression of weakness of the right lower extremity from grade 1/5 to grade 2/5. Deep tendon reflexes decreased with time. Hypoesthesia developed at T10. Cranial, cervical, thoracic, and lumbar magnetic resonance imaging (MRI) were planned after these complaints and findings. Thoracic MRI showed a T1 isointense (Figure 1) and T2 hyperintense (Figure 2) mass lesion in the posterior epidural space. The patient was subsequently hospitalized in the neurosurgery clinic. Hematoma evacuation and decompression laminectomy were immediately performed. The patient was discharged from the hospital on post-operative day 9 with total recovery.

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Figure 1. Contrast enhanced T1-weighted sagittal image showing the isointense posterior epidural mass lesion, without contrast enhancement, that compressed the spinal cord at the level of thoracic 1-2 vertebrae (black arrow)

Figure 2. T2-weighted sagittal image showing the hyperintense posterior epidural mass lesion that compressed the spinal cord at the level of thoracic 1–2 vertebrae (black arrow)

Discussion

Spontaneous SEH is an important clinical presentation for neurological emergency. Spontaneous SEH may appear due to epidural venous plexus favored by coagulation, hemangiomas, or spinal arteriovenous malformations (4).

Early detection of spontaneous SEH is difficult process due to atypical symptoms. Clinical symptoms suddenly occur, and neurological symptoms may vary (5). Most researchers claim that it occurs at the epidural venous plexus in the spinal epidural space of the thoracic spine, and the abdominal cavity can also be directly affected. However, Miyagi et al reported that arterial blood supply is a more persuasive force for pressure inside the venous plexus as it is lower than that in the epidural space. Furthermore, in some cases, rapidly deteriorating neurological deficits after the initial onset of back pain or lumbago indicated a rapid formation of the hematoma and spinal cord compression, which is suggestive of the arterial origin of spontaneous SEH (6).

Prompt diagnosis is difficult due to atypical symptoms, variations in age, and clinical suspicion is also difficult. Rapid diagnosis by MRI is pivotal because neurological symptoms are often severe (7). Although epidural hematomas are usually found on the posterior spinal cord in a lentiform shape, spontaneous SEHs are commonly observed on the anterolateral and around the spinal cord in a semi-circular pattern, accompanied with compression and some displacement (8).

Spontaneous SEH should be routinely considered in patients who have symptoms of spinal cord compression without other clinical findings. Spinal masses are frequently noticed during differential diagnosis. Definitive diagnosis is mostly achieved with operation. Not only are the findings of spontaneous SEH seen; furthermore, pathological evaluation is also required to diagnose lymphoma and metastasis. In addition, MRI findings of these conditions are similar to those of spontaneous SEH. Spontaneous SEH mostly occurs in the thoracic spine, usually extending over several vertebrae. The pathological specimen in our case was a hematoma. Surgical removal of the hematoma was inevitable in this case, although conservative treatment may be sufficient in some cases (9).

Our patient suffered from lumbar pain for approximately 10 days. Neurological examination was normal during the first evaluation of the patient. Oversensitivity of the spinal process and paravertebral line of the thoracic vertebrae was established. However, SEH should be considered by emergency physicians in the pre-diagnosis of patients with a variety of neurological complaints. Fortunately, the rapidly deteriorating neurological deficits during observation and the subsequent emergency neurosurgery intervention ensured smooth recovery for our patient.

Spontaneous SEH should be suspected in patients admitted with a common back pain in crowded emergency departments. Early diagnosis and timely management of spontaneous SEH may improve prognosis and outcome. In this case, MRI was vitally important as the patient presented with neurological symptoms following back pain.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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Should We Routinely Screen for Warfarin Gene Polymorphism in Patients with Coumadin Overdose?

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Abstract

Genetic polymorphisms can affect an individual's response to the pharmacological agents. Warfarin has a narrow therapeutic range and dose arrangement may vary from individual to individual. An insufficient dose may fail to prevent thromboembolism and overdose may increase the risk of bleeding. Increasing evidence suggests that genetic variation of CYP2C9 and VKORC1 greatly influences effective warfarin dosing (1). In the present case report, frequently occurring warfarin toxicity was caused by a genetic mutation in the patient with mitral valve replacement.
Keywords: warfarin, genetic, CYP2C9, VKORC1

Case Report

A 45 year-old female patient applied to the cardiology clinic with the complaint of nose-bleeding. The patient had a history of mitral valve re-placement one year ago and she had been started on warfarin (5 mg/day). The patient had been followed up for recurrently developing warfarin toxicity in different clinics. When she applied to our clinic with the INR (International Normalized Ratio) value of 8.9, she was hospitalized due to warfarin toxicity. The patient, who had no active bleeding, was given 2 units of fresh frozen plasma (FFP). After FFP application, the INR value regressed to 3.5. The patient, whose INR value was 2.3 in the follow-up, was restarted on warfarin (2.5 mg) and was discharged with recommendations. After one week, the patient applied to the emergency unit due to active nose bleeding and because examinations revealed an INR value of 14.7. She was hospitalized in our clinic for warfarin toxicity again. The patient was given 20 mg intravenous vitamin K and 2 units of FFP. The INR value in the control examination was 3.07 and the complaint of active bleeding regressed. Warfarin gene polymorphism was studied in order to adjust the dose of warfarin because the patient frequently had warfarin toxicity. Genetic testing revealed heterozygote mutation in the CYP2C9*2 C430T region and homozygote mutation in the VKORC1 C1173T and G1639A regions. The patient, who was found to have warfarin resistance and increased sensitivity, was discharged by recommending a quarter dose of warfarin for 2 days in a week and to visit the hospital for INR control one week later.

Discussion

Warfarin is the specific inhibitor of vitamin K epoxide reductase (VKOR), which is coded by the VKORC1 gene. Warfarin shows its anticoagulant effects by preventing the competence of VKORC1 in the production of vitamin K reduced from the epoxide form. Functional abnormalities in VKORC1 are also known as the resistance to coumarin-type anticoagulant drugs (warfarin resistance) (1, 2). Moreover, due to the mutation in VKORC1, vitamin K cannot be activated through hydroxylation and no coagulation occurs. Genetic polymorphisms in VKORC1 clearly affect the dose of warfarin and cause undesirable bleeding events (3). In a study conducted on this condition, the data of 110 patients that had severe bleeding attacks under warfarin treatment and 220 control cases without any bleeding, despite receiving a similar treatment, were compared. The patients were specifically examined in terms of VKORC1 C1173T polymorphism and an increase was observed in the risk of bleeding in patients with existent mutation (4). Coumarin derivatives were used in this study (4).

Warfarin is a racemic mixture and it is metabolized via cytochrome enzymes in the liver. In stable conditions, S-warfarin constitutes 60%-70% of the anticoagulant response and the R-enantiomer constitutes 30%-40%. Primarily, S-warfarin is metabolized by CYP2C9 and R-warfarin by CYP3A4, CYP1A2, and CYP1A1. The genetic variations of CYP2C9, CYP3A4, CYP1A2, and CYP1A1 lead to individual deviations in the potentially effective dose of warfarin, and the isomer that is frequently studied among these cytochromes is CYP2C9 (5).

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Currently, more than 50 variants of CYP2C9 have been defined, but CYP2C9*2 and CYP2C9*3, which are seen more often, are important with regard to their effects on the dose of warfarin (3). The direct relationship between the CYP2C9 genotype and anticoagulant (or bleeding) effects was firstly reported by Higashi et al. (6). Subsequently, from a systematic meta-analysis, it was emphasized that a lower maintenance dose of warfarin was needed in patients with the CYP2C9*2 or CYP2C9*3 allele (7).

In our case, mutations were detected both in the CYP2C9*2 C430T region and in the VKORC1 C1173 T and G1639A regions. That is to say, our patient was prone to bleeding because of metabolism impairment and also in vitamin K activation. There were probably two causes of bleeding in our patient: Firstly, mutation in CYP2C9 prevented inactivation of warfarin and consequently, led to bleeding. Secondly, impairment in the activation of vitamin K via hydroxylation due to mutation in VKORC1 inhibited the formation of coagulation and caused bleeding. Mutation in both metabolic pathways increased the risk of bleeding and led to bleeding by causing recurring warfarin toxicity in our patient. In this case, the only application that can be performed is serious reduction in the dose of warfarin (3). A schematic picture is presented for understanding warfarin metabolism and gene polymorphism (Figure 1).

In conclusion, this study emphasizes that genetic polymorphism must be studied for a patient having a history of mitral valve replacement and bleeding secondary to warfarin toxicity, and adjustment must be done according to the results of that study. We strongly recommend our colleagues encountering similar situations to perform warfarin polymorphism analysis.

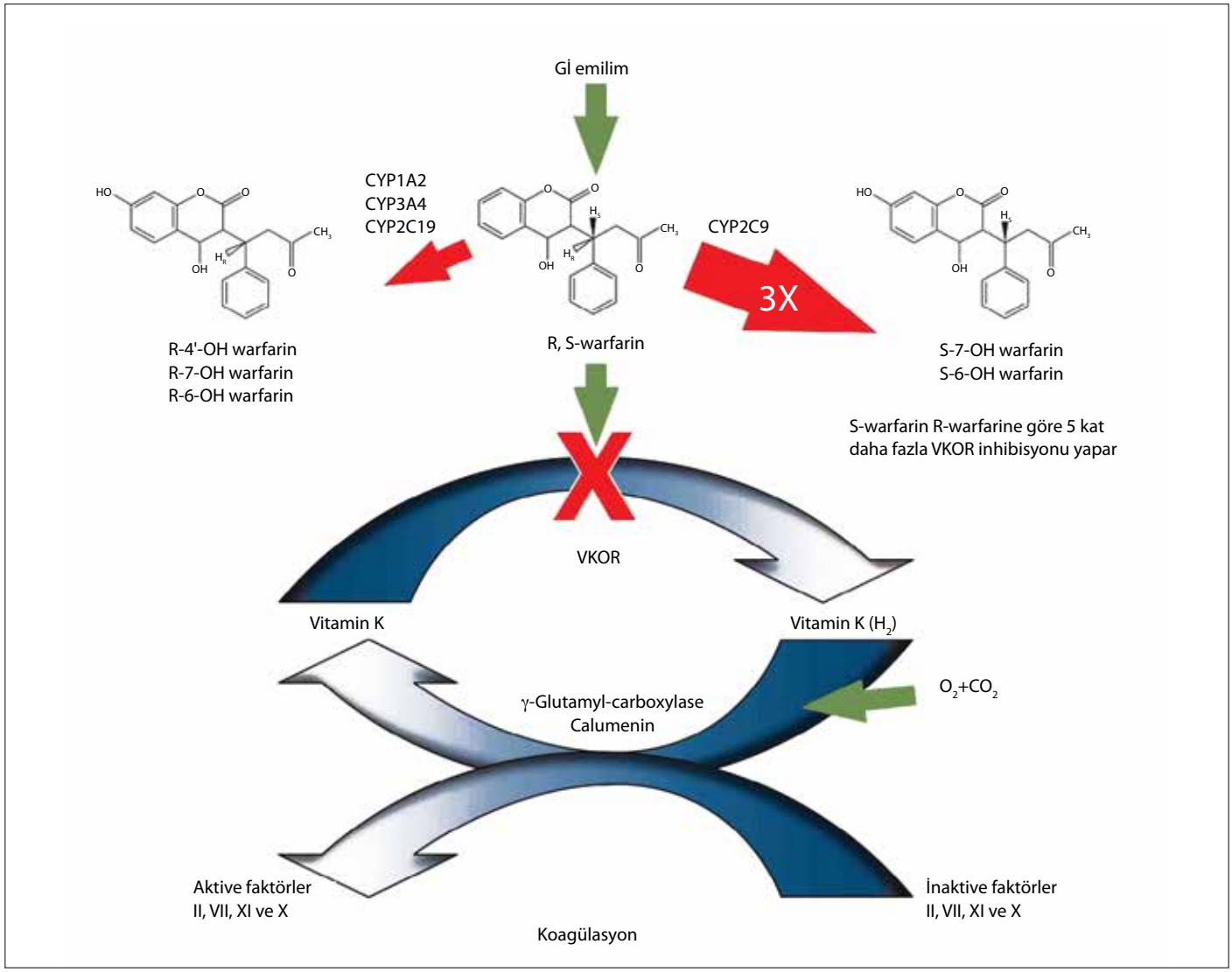

Figure 1. The coagulation cascade is inhibited by warfarin. Warfarin has two enantiomers (R-warfarin and S-warfarin), and it is absorbed from the gastrointestinal (GI) tract at the rate of 93%. Warfarin is metabolized by cytochromes (often by CYP2C9) in the liver. CYP2C9 selectively performs hydroxylation of S-warfarin and converts it into inactive metabolites. CYP1A2, CYP3A4, and CYP2C19, which are other isomers of cytochrome P450, selectively perform hydroxylation of R-warfarin and converts it into inactive metabolites. S-warfarin is metabolized at a rate three times higher than that of R-warfarin. The Vitamin-K epoxide reductase (VKOR) enzyme hydroxylates vitamin K and it converts it into active vitamin K (Vit-K(H2)). Active vitamin K activates inactive coagulation factors (factor II, VII, XI, and X) through carboxylation.
Moreover, S-warfarin inhibits vitamin K epoxide reductase (VKOR) 5 times more potently than R-warfarin.

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