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Health Sciences Quarterly (Health Sci. Q.) journal as known by the name of "Journal of Scientific Perspectives" until April 2021 which has been published since 2017 is an international peer-reviewed journal of HOLISTENCE ACADEMY. It is published quarterly in January, April, July, and October. All manuscripts submitted for publication are evaluated by the editor-in-chief, section editor, editorial board, and referees. In addition, the journal provides a medium for highlighting selected articles reporting highly significant original findings, as Editor's Choice Manuscripts.

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Health Sciences Quarterly (Health Sci. Q.) is an open-access journal that publishes original research papers, case reports, and reviews, clinical studies covering a wide range of subjects in life sciences and medicine as well as clinical and experimental investigations only in English.

Researchers in health sciences will find much of great use and interest in the Health Sci. Q.

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CONTENTS

ORIGINAL ARTICLE
The effects of cultural and emotional intelligence on care in nursing 1
Elanur Uludağ & Betül Mumcu

ORIGINAL ARTICLE
Significance of laboratory biomarkers in monitoring patients with COVID-19 pneumonia 13
Hasan Ölmez & Mustafa Tosun

ORIGINAL ARTICLE
Rising health problem of Türkiye, healthcare professionals' suicides in media 27
Mahmut Şerif Yıldırım & Ramazan Akçan & M. Zeyıt Alemdar

ORIGINAL ARTICLE
Tracheal intubation is not difficult with flexible bronchoscopy guidance 35
Sibel Günay & Ersin Günay & Aydın Balcı & İbrahim Güven Cosgun & Şule Çilekar & Şule Esen Karamişe & Feyza Merve Sekkin Sınıcı & Remziye Gül Sıvacı

ORIGINAL ARTICLE
Evaluation of surgical antibiotic prophylaxis 43
Havva Tünay

ORIGINAL ARTICLE
Psychological resilience and stress coping methods in patients presenting with conversive symptoms and general medical symptoms 49
Fadime Kaya & Nihal Bostancı Daştan & Handan Çiftçi

CASE REPORT
Improvement in renal function after empirical steroid therapy in NSAID-induced acute kidney injury 59
Mateusz Marzec

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ORIGINAL ARTICLE

The effects of cultural and emotional intelligence on care in nursing

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Abstract

This study was conducted to find out the effects of cultural intelligence, which is one of the strategies used in managing intercultural differences, and emotional intelligence which enables individuals to understand and manage their own emotions, to understand others' emotions and develop their self-confidence, on care behaviour, which is the basis of the nursing profession. This descriptive and cross-sectional study was conducted in a city hospital between 01.09.2019 and 01.03.2020. The data were collected from nurses in the hospital who volunteered to participate in the study within the dates above. The sample was not selected, and 225 nurses who volunteered to participate in the study were included in the study. The total mean score of the participants from the cultural intelligence scale was 47.558±12.092, while the full scores from the factors were 7.9208±2.857 (min 4-max 20) for meta-cognitive factor, 15.963±4.89 (min 6-max 30) for cognitive aspect, 12.004±3.656 (min 5-max 25) for motivational factor and as 11.821±3.493 (min 5-max 25) for behavioural factor. The total mean score of the participants from the *Caring Behaviors Inventory* was 5.053±0.819, while the total scores from the factors were 5.045±0.823 for the assurance factor, 5.208±1.240 for the knowledge and skill factor, 4.994±0.831 for respectful factor and 4.949±0.842 for connectedness factor. The total mean score of the participants from the *Emotional Intelligence Scale* was 141.367±18.656, while the full scores from the factors were 44.563±5.96 for optimism/mood regulation, 18.940±4.15 for the use of emotions and 33.493±7.565 for evaluation of emotions. Cultural intelligence and emotional intelligence were found to have an effect on caring behaviours of nurses. Although there was no direct significant correlation between cultural intelligence total score and caring behaviours total score, there was a significant correlation between cultural intelligence factors and caring behaviours. There was a significant correlation between caring behaviours of nurses with high emotional intelligence.

Keywords: Emotional intelligence, nursing care, cultural intelligence.

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Introduction

Cultural intelligence refers to an individual's ability to function effectively in a different cultural climate [1]. The increase in cultural diversity in societies and the development of health tourism have increased the importance of culture-based care in nursing [2]. Since effective communication has to be established in nursing [3], behaviours such as empathising with the patient during care, choosing behaviours appropriate for cultural differences, respecting the culture encountered, being sensitive and increasing motivation are important for being successful in nursing [4]. Nurses' having high cultural intelligence levels enable them to make correct decisions in important situations, to establish healthy team work with colleagues and to communicate effectively with their patients and as a result these can increase the quality of care given to patients and accordingly patient satisfaction [5,6]. Emotional intelligence can be evaluated as the ability to understand and manage emotions in a way beyond the cultural intelligence environment [7,8]. Since emotional intelligence has the potential to affect quality of patient care, the consequences of care, decision making and critical thinking in order to improve nursing practices, it is a concept that can be at the core of nursing practice [9].

Care practices are fundamental to nursing and they are among the independent functions of nurses. Therefore, the success of nursing care is associated with the success of the profession [5]. Just like nurses' perception of health problems, health care and expectations of health may differ from culture to culture and their perceptions of care may also be different. Ignoring these differences prevents the quality of care. As a result of these differences, understanding cultural differences, valuing differences and empathising, showing respect, being patient, analysing behaviours and differences of individuals are behaviours that may be right to increase the quality of care. Nurses increase their job satisfaction and nurse-patient cooperation as long as they understand the wishes of individuals and provide care accordingly [10]. Nursing care is affected by cultural variety in care practices [2,11]. Since nursing is a cultural phenomenon, individuality in care, holistic evaluation of the individual and planning and implementing initiatives can be realized through cultural intelligence [2,12]. Providing care by considering the cultural values of patients and understanding their emotions will increase the quality of care [13,14]. In nursing, where emotions play an important role, evaluating sick or healthy individuals with a holistic perspective plays an important role in the development and advancement of the profession [13,15]. Because there is a correlation between culture and emotion, a correlation between cultural intelligence and emotional intelligence is also possible [16]. The common features of cultural and emotional intelligence are commenting on the cultures, behaving appropriately, avoiding judgement and the tendency to think before acting. Especially in intercultural interactions, there is a need for cultural intelligence and emotional intelligence skills for individuals to communicate correctly [17,18]. It is important for nurses to have these mental skills and to use these skills in order to be able to provide professional and integrative care. For this reason, it is very important for nurses to understand that cultural and emotional intelligence are essential in providing patient-centred care, both intelligences can be learned and developed more [18]. Studies conducted have examined the effects of cultural intelligence and emotional intelligence on nursing care together and the number of studies on this is limited. The aim of this study, which we think will provide contributions to nurses and other healthcare professionals in providing a more quality health service with positive care and higher motivation aims to find out the effects of cultural intelligence and emotional intelligence of nurses working in a hospital on the nursing care they provide and to examine the relationship between these two factors.

Materials and Methods

Ethical Considerations of the Study

Required permissions were obtained from the Scientific Research and Publication Ethics Committee of Gümüşhane University (2019/6), and Elazığ Provincial Directorate of Health to

which the hospital is affiliated and the hospital management (13281952-702.99). Permission to use each of the scales was taken from the researchers who conducted the Turkish reliability and validity study. The participants were informed about the study by the researcher and the forms were distributed after oral and written informed consents were taken.

Aim and Type of the Study

This study was conducted to find out the effects of cultural intelligence, which is one of the strategies used in managing intercultural differences, and emotional intelligence which enables individuals to understand and manage their own emotions, to understand others' emotions and to develop their self-confidence, on care behaviour, which is the basis of nursing profession. This descriptive study was carried out at Elazığ Fethi Sekin City Hospital between 01.09.2019 and 01.03.2020.

Population-Sample

The data were collected from nurses (N:600) who were in the hospital between September 2019 and March 2020 and who agreed to participate in the study. The sample was not selected and 225 nurses who agreed to participate were included in the study.

Data Collection Tools

A survey form was used in the study as data collection tool. The survey form used consists of 4 parts. The first part included questions to determine the participants', socio-demographic features such as age, gender, the region where they spent most of their lives, working years and position, the unit they worked in, and whether they thought nursing care was sufficient. *Cultural Intelligence Scale* (CIS) developed by Ang et al. in 2017 and adapted into Turkish by İlhan and Çetin, was used in the second part [19]. The *Cronbach's alpha* value of the scale was given as 0.85, and the *Cronbach's alpha* value for this study was found to be 0.93. While the minimum possible score from the scale is 20, the maximum possible score is 100. Increased total score and factor scores show high cultural intelligence. The third part included *Caring Behaviors Inventory* (CBI)-24 developed by Wu et al. in 2006 and adapted into Turkish by Kurşun and Kanan [20]. The *Cronbach's alpha* value of the scale was given as 0.80, and the *Cronbach's alpha* value for this study was found to be 0.93. Increased total and factor scores show increased care quality perception levels (patients or nurses). In the third part, *Schutte Emotional Intelligence Scale* developed by Schutte et al. in 1998 and adapted into Turkish by Tatar et al. in 2011 was used [21]. The *Cronbach's alpha* value of the scale was given as 0.90, and the *Cronbach's alpha* value for this study was found to be 0.89. While the minimum possible score from the scale is 41, the maximum possible score is 205, and an increased score shows increased emotional intelligence.

Data Analysis

The data obtained in the study were analysed in computer environment by using SPSS 22.0 package program. Number-percentage distributions, *t test*, ANOVA test and correlation analyses were used in data assessment.

Results

When the demographic characteristics of the individuals who participated in the study were examined, it was found that 75.6% were female, the mean age was 32.67± 8.05, 64.9% were married, 65.3% had spent most of their lives in the Eastern Anatolian region, 70.2% were undergraduates, 14.7% had an associate degree, 59.6% had children, and 88.9% were living in a nuclear family (Table 1).

When the professional descriptive characteristics of the individuals in the study were examined, it was found that 40.4% of the nurses had a working time longer than 11 years and more and 22.7% had a working time between 6 and 10 years, 71.6% practiced nursing willingly, 57.8% cared for a mean of 11 to 20 patients in their units, while 15.6% cared for 1 to 10 patients and 13.3% cared for 21 to 30 patients, 81.8% were clinic nurses, 42.7% were working in shifts, and 24% were working during the day, 65.8% were working for more than 40 hours a week, 65.8% cared for 1 to 10 patients and 23.6% cared for 11 to 20 patients, 54.2% thought the care they provided to patients was sufficient, 26.2% thought the care was partly sufficient. When the participants were asked why they thought care was insufficient,

78.7% answered that the workload in the service was too much, 72.9% answered that the number of nurses was insufficient, 67.1% answered that there were too many patients, and 60.4% answered that they thought care was insufficient both because there was no time and also because they were not working in the service they wanted (Table 2-3).

Total mean score of the participants from cultural intelligence scale was 47.558±12.092, while the total scores from the factors were 7.9208±2.857 (min 4-max 20) for meta-cognitive factor, 15.963±4.890 (min 6-max 30) for cognitive factor, 12.004±3.656 (min 5-max 25) for motivational factor and as 11.821±3.493(min 5-max 25) for behavioural factor. The total mean score of the participants from the *Caring Behaviors Inventory* was 5.053±0.819, while the total scores from the factors were 5.045±0.823 for assurance factor, 5.208±1.24 for the knowledge and skill factor, 4.994±0.831 for respectful factor and 4.949±0.842 for connectedness factor. The total mean score of the participants from *Emotional Intelligence Scale* was 141.367±18.656, while the total scores from the factors were 44.563±5.960 for optimism/ mood regulation, 18.940±4.15 for use of emotions and 33.493±7.565 for evaluation of emotions. When the correlation between the scores taken from the scales was examined, a positive significant correlation was found between caring behaviours and emotional intelligence scale total scores (r= .439; p= .000; p<0.01). No significant correlation was found between caring behaviours and cultural intelligence scale scores. No significant correlation was found between emotional intelligence and cultural intelligence scale total scores (p>0.01). When the correlation between the factors of scales were examined, a negative significant correlation was found between cultural intelligence scale cultural metacognitive factor and caring behaviours scale assurance (r= -.214; p= .001; p<0.01), respectful (r= -.253; p= .000; p<0.01) and connectedness

Table 1. Socio demographic characteristics of the participants (n=225)

Characteristics		**Mean ± SD**	**n**	**%**
Age (years)		32.67±8.050		
Gender	Female		170	75.6
	Male		55	24.4
Marital status	Married		78	34.7
	Single		146	64.9
Educational status	High school		24	10.7
	Associate degree		33	14.7
	Undergraduate		158	70.2
	Post graduate		10	4.4
The region where you spent most of your life	Mediterranean region		16	7.2
	Eastern Anatolia region		147	65.3
	Aegean region		11	4.9
	Southeastern Anatolia region		25	11.1
	Central Anatolia region		10	4.5
	Black Sea region		6	2.7
	Marmara region		8	3.6
The state of having children	Yes		134	59.6
	No		87	38.7
Family type	Nuclear		200	88.9
	Extended		17	7.6

**There was lost data since some of the questions were not answered.*

Table 2. Descriptive characteristics of the participants about the profession (n=225)

Characteristics		**n**	**%**
Working years	6 months-1 year	30	13.3
	2-5 years	50	22.2
	6-10 years	51	22.7
	11 years and longer	91	40.4
The state of performing the profession willingly	Yes	161	71.6
	No	45	21.8
The service you are working in	Inpatient service	67	29.8
	Intensive care	71	31.6
	Outpatient clinic	7	3.1
	Gynaecology service	9	4
	Surgical service	15	6.7
	Internal medicine service	19	8.4
	Emergency service	15	6.7
	Pediatric service	6	2.7
	Other (dialysis, operating room, etc.)	15	6.7
Total working years in the current service	Less than 1 year	50	22.2
	1-5 years	130	57.8
	6-10 years	26	11.6
	11-15 years	7	3.1
	16 years and more	7	3.1
Working position	Clinic Nurse	184	81.8
	Nurse in charge	35	15.6
Type of working	Daytime	54	24
	Shift	96	42.7
	Both	68	30.2
Weekly working time	40 hours	77	34.2
	More than 40 hours	148	65.8
Number of mean patients in the service you are working	1-10	35	15.6
	11-20	130	57.8
	21-30	30	13.3
	31 and more	29	12.9
The number of patients each nurse is responsible for	1-10 patients	148	65.8
	11-20 patients	53	23.6
	21-30 patients	8	3.6
	31 patients and more	15	6.7

** There was lost data since some of the questions were not answered.*

(r= -.280; p= .000; p<0.01) factors. Negative significant correlation was found between cultural metacognitive factor and emotional intelligence scale optimism/mood regulation (r= -.277; p= .000; p<0.01), use of emotions (r= -.138; p= .041; p<0.05) and evaluation of emotions (r= -.241; p=.000; p<0.01). Positive significant correlation was found between cultural cognition and caring behaviours scale knowledge and skill (r=.142; p=.036; p<0.05) factor. Positive significant correlation was found between cultural cognition and emotional intelligence use of emotions (r= .289; p= .000; p<0.01) and evaluation of emotions (r= .187; p= .006; p<0.01) factors. Negative significant correlation was found between cultural motivation and caring behaviours scale respectful (r= -.136; p= .045; p<0.05) and connectedness (r= -.171; p= .011; p<0.05) factors. Positive significant correlation was found between cultural motivation and emotional

Table 3. Participants' thoughts on care (n=225)

Question		**n**	**%**
Do you think that nursing care is sufficient?	Yes	112	54.2
	No	40	17.8
	Partly	59	26.2
What do you think the reasons for nursing care to be insufficient are?	The fact that nurses cannot work in the services they want	136	60.4
	Too many patients	151	67.1
	Insufficient member of nurses	164	72.9
	Too much work load except patient care in the service	177	78.7
	Not having enough time for care	136	60.4
	Other reasons	84	37.3

** There was lost data since some of the questions were not answered.*

Table 4. Total scores of the scales

Scales and Factors	**n**	**Mean ±SD**
Cultural Intelligence Scale total score	213	47.558±12.092
Metacognitive factor total score	225	7.92 ±2.857
Cognitive factor total score	218	15.963±4.89
Motivational factor total score	221	12.004±3.656
Behavioural factor total score	224	11.821±3.493
Caring Behaviors Scale total score	217	5.053±0.819
Assurance factor total score	220	5.045±0.823
Knowledge and skill factor total score	224	5.208±1.24
Respectful factor total score	222	4.994±0.831
Connectedness factor total score	223	4.949±0.842
Emotional Intelligence Scale total score	185	141.367±18.656
Optimism/Mood regulation factor total score	206	44.563±5.96
Use of emotions factor total score	219	18.94±4.15
Evaluation of emotions factor total score	219	33.493±7.565

** There was lost data since some of the questions were not answered.*

intelligence use of emotions (r= .144; p= .034; p<0.05) factor. Negative significant correlation was found between cultural behaviour and caring behaviours scale assurance (r= -.179; p= .008; p<0.01), knowledge and skill (r= -.142; p= .034; p<0.05), respectful (r= -.231; p= .001; p<0.01) and connectedness (r= -.257; p= .000; p<0.01) factors. Negative significant correlation was found between cultural behavior and emotional intelligence optimism/mood regulation (r= -.210; p= .002; p<0.01) factor (Table 4-5).

When the scores taken from the scales and gender were compared, statistically significant difference was found in terms of caring behaviours and all factors and emotional intelligence and all factors (p<0.05), with women having higher scores. There was also significant difference between cultural meta-cognitive factor and gender which was found to be higher in men (p<0.05). No significant difference was found between the state of having children and the scales (p>0.05). When the scales and the state of performing nursing willingly were compared, significance was found between caring behaviours scale total score and the factors assurance, respectful and connectedness (p<0.05). When the answers of the participants to the question "do you think that the nursing care is sufficient" were compared with the scales, significance was found only between caring behaviours scale connectedness factor and emotional intelligence total score (p<0.05). No significant difference was found between the scales and the region where the participants spent most of their lives. When the scales, factors and working years were compared, statistically significant difference was found only between cultural cognitive factor and individuals who had a working time between 2-5 years and 11 years and more (p<0.05), and mean cultural cognition score was found to be higher in individuals with 11 and more working years.

Table 5. Correlation between emotional intelligence, cultural intelligence and care behaviours scales

Scale/Factor	n	Mean± SD	1	2	3	8	9	10	11	12	13	14
1. Caring Behaviors Scale	217	5.053±0.819		.43**								
2. Emotional Intelligence Scale	185	141.367±18.656			-.06							
3. Cultural Intelligence Scale	213	47.558±12.092	-.09									
4.Cultural metacognitive	225	7.920 ±2.857				-.21*		-.25*	-.28*	-.27*	-.13**	-.24*
5.Cultural cognitive	218	15.963±4.890					.14**				.28*	.18*
6.Cultural motivational	221	12.004±3.656						-.13**	-.17**		.14**	
7.Cultural behavioural	224	11.821±3.493				-.17*	-.14**	-.23*	-.25*	-.21*		
8.Assurance	220	5.045±0.823										
9. Knowledge and skill	224	5.208±1.240										
10.Respectful	222	4.994±0.831										
11.Connectedness	223	4.949±0.842										
12.Optimisim/Mood regulation	206	44.563±5.960										
13. Use of emotions	219	18.940±4.150										
14. Evaluation of emotions	219	33.493±7.565										

**p<0.01, **p<0.05*

When the scores taken from the scales were compared with the number of patients cared for, statistically significant difference was found between nurses who had 1-10 patients and nurses who had 11-20 patients in terms of cultural intelligence factor cultural cognition, caring behaviour scale knowledge and skill factor and emotional intelligence evaluation of emotions and use of emotions scores ($p<0.05$) and the patients who a had a score between 1 and 10 were found to have higher scale scores. When the scales, factors and how nurses worked were compared, statistically significant difference was found between the nurses who worked in shifts and those who worked during the day in terms of cultural intelligence total score, cultural motivation and emotional intelligence factor use of emotions ($p<0.05$) and it was found that the nurses who worked in shifts had higher total scores; there was a statistically significant difference between the nurses who worked in shifts and those who worked during the day in terms of caring behaviours scale connectedness factor total score ($p<0.05$) and nurses who worked during the day had higher connectedness total score. Statistically significant difference was found between the nurses who worked in shifts and those who worked during the day and night in terms of cultural behaviour factor ($p<0.05$) and the nurses who worked in shifts had higher total score.

Discussion

It was found that the mean total scores of the participants included in the study was moderately low, total mean score of meta cognitive factor was low and the total mean score of cognitive, motivational and behavioural factors were moderate. While there are studies in literature which found high cultural intelligence scores in literature [2], there are also studies which were in parallel with our study [22]. The emergence of different results brought to mind the individual differences of the individuals who participated in the study.

It was found that the mean total scores of the participants from the emotional intelligence scale and the scale factor optimism/mood regulation total score were moderately high, while the use of emotions and evaluation of emotions factors were moderate. Our results were in parallel with some of the literature [5,23]. In a study conducted in 2017 by Kılıç et al. on nursing students, it was concluded that emotional intelligence levels needed to be improved [13,14]. This result, which was different from our study, can be due to the fact that the study participants were young and did not have working experience. The total mean scores of the participants from the caring behaviours scale and the factors of the ranking were found to be high. This result is in parallel with the literature [5]. When the correlation between the scores taken from the scales was examined, a significant positive correlation was found between caring behaviours and emotional intelligence scale total scores. This result is in parallel with the literature. It shows that the increase in patient satisfaction, which is an indicator of growth in the quality of care and, at the same time qualified care, is directly associated with the care provided by nurses with high emotional intelligence [5,23]. Nurses who understand patients' emotions and are aware of their own feelings can comprehend the situation patients are in more clearly and manage caring behaviours correctly. It is thought that such behaviour will strengthen the communication between nurse and patient, and it will increase the quality of care.

In addition, holistic approaches of nurses to patients and their ability to decide what will be helpful for each patient are related to their emotional intelligence [23]. No significant correlation was found between the cultural intelligence scale's total score and the scores of the other two scales. A negative correlation was found between cultural intelligence cultural metacognitive factors and caring behaviours assurance, respectful and connectedness factors and all factors of the emotional intelligence scale. This result can be associated with the moderately low scores of nurses on cultural and emotional intelligence scales [16]. It also brought to mind that nurses are unaware of emotions and the cultural knowledge they use during care and that increased cultural intelligence levels will cause a positive reflection on caring behaviours. Thus, it will be possible to provide quality

care appropriate to the culture. A positive and significant correlation was found between cultural cognition and caring behaviours knowledge and skill and emotional intelligence factors and between emotional intelligence. Individuals with high cultural awareness successfully comprehend the similarities and differences of intercultural situations. Our study also found that nurses with moderate cultural cognition tended to use their information and skills and meet the care needs of patients from different cultures to have enough experience and knowledge about culture-specific care. While a negative significant correlation was found between cultural motivation and caring behaviours scale respectful and connectedness factors, significant positive correlation was found between cultural motivation and emotional intelligence use of emotions factor. This result can also be associated with moderate scores taken from the scales. A negative significant correlation was also found between cultural behaviour and care behaviour scale all factors and emotional intelligence optimism/mood regulation factor. These results brought to mind that nurses cannot use effective communication methods when they encounter individuals from different cultures and their behaviours hurt care management. These results are different from the study in the literature [14]. Study conducted showed a positive correlation between emotional intelligence scale factors and cultural intelligence levels and cultural intelligence scale total mean scores and individualised care scale total scores [24]. When the scores obtained from the scales and genders were compared, a significant difference was found between care behaviours and all factors and emotional intelligence and all factors. The difference was found to be higher in women. While some of the studies did not find a difference between intelligence and gender [3], other studies reported differences or they reported that women had higher emotional intelligence even if there were no differences [1,25]. It can be thought that the difference between studies can be that the sample groups in the studies have different cultural structures. Socio-demographic characteristics are not key factors. However, professional characteristics affect emotional intelligence level. Another result showed that there were no differences between genders in terms of care behaviours [5]. This difference was thought to result from gender percentages in the sample or the gender distribution of the nurses working in services providing care to patients.

There were also significant differences between cultural metacognitive factors and gender, which was found to be higher in men. This result is in parallel with the literature [4]. A significant difference was found between the state of performing the profession willingly and caring behaviours scale total score and assurance, respectful and connectedness factors. It can be seen that individuals who perform their job willingly have positive care behaviours and they show a behavioural effort to present more quality care. When the scales and factors were compared with working years, statistically significant difference was found only between cultural metacognitive aspect and the individuals who had a working year between 2-5 years and those who had 11 and higher working years and the cultural cognitive mean score was found to be higher in individuals with a working year of 11 years and more. Studies conducted have shown a negative correlation between years in the profession and cultural intelligence total score [26]. This difference is thought to result from the fact that nursing profession and nursing education change continually and the increased probability of caring for individuals from different cultures in time. In our study, significant correlation was found between a normal number of patients cared for and caring behaviours, emotional intelligence and cultural intelligence scale. It can be seen that this result is in parallel with the literature [5].

Conclusion

The research includes nurses working at Fethi Sekin City Hospital between 01.09.2019-01.03.2020. Sample selection was not made, and it consisted of 600 nurses who were in the hospital on the specified dates and agreed to participate in the study voluntarily. A generalisation can be made by repeating the study with a larger sample.

It was found that cultural and emotional

intelligence affect caring behaviours. It is important to develop cultural and emotional intelligence since cultural intelligence and emotional intelligence have a positive effect on nurses' job satisfaction, stress level, burnout, quality and consequences of patient care, decision making, critical thinking, empathising, effective communication, task performance and motivation. Nurses provide care in a more motivated way and providing care by understanding the patient and the patient's needs increases the efficacy and quality of care and helps both the patient and the nurse. Cultural and emotional intelligence levels, which can be acquired and developed during nursing education by including in the curriculum or during professional life with periodical in-service training programs, should be increased and used in clinic. Many studies report that training programs should be increased to develop the cultural and emotional intelligence of nursing department students and nurses.

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Conflict of Interest

The authors declare that there are no conflict of interests.

Data Availability Statement

Data available on request from the authors.

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ORIGINAL ARTICLE

Significance of laboratory biomarkers in monitoring patients with COVID-19 pneumonia

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Abstract

Clinical and laboratory parameters are useful tools to improve success rates in the management of COVID-19 patients. Indices such as NLR, PLR, MHR, SII, AIP and CAR may indicate poor prognosis in predicting poor prognosis in COVID-19. It was aimed to identify such parameters of disease progression in COVID-19 patients by examining demographic data, comorbid conditions, some biochemical and hematological parameters. A retrospective analysis was performed for patients admitted to intensive care unit or pulmonary diseases department or treated on an outpatient basis due to a diagnosis of COVID-19. Patients with positive PCR test and thoracic CT compatible with COVID-19 pneumonia were included in the study. A control group was formed from volunteers of similar age and gender. The study population was divided into four groups as follows: patients admitted to intensive care unit (ICU group); patients admitted to chest diseases department (Inpatient Group); patients treated on an outpatient basis (Outpatient Group); and controls (Control Group). There were 61, 201, and 30 patients in the ICU, inpatient, and outpatient groups, respectively. A total of 96 subjects served as controls. Study groups were comparable with respect to gender distribution. ICU patients had higher NLR, PLR, AIP, SII, and CAR, and lower LMR as compared to other groups. NLR, SII, AIP, and CAR emerged as predictors of ICU admission, while MHR was predictive of inpatient treatment. Certain clinical and laboratory parameters may be useful tools for improving the success of COVID-19 management. High NLR, SII, AIP, CAR, and MHR values may indicate low prognosis in COVID-19 patients.

Keywords: Biochemical indexes, COVID-19, laboratory parameter, intensive care unit

Abbreviations: NLR, Neutrophil to lymphocyte ratio; LMR, Lymphocyte to monocyte ratio; PLR, Platelet to lymphocyte ratio. MHR, monocyte to HDL-C ratio; SII, Systemic immun inflammatory index; AIP Atherogenic index of plasma; CAR, C-reactive protein to albumin ratio; PCR, Polymerase Chain Reaction; ICU, intensive care unit.

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Introduction

In December 2019, a cluster of pneumonia cases with unknown etiology has been observed in Wuhan city of China. Subsequently, the causative agent was found to be a novel type of enveloped RNA beta-coronavirus, later termed as the *severe acute respiratory syndrome coronavirus-2* (SARS-CoV-2) [1]. Lungs are the most important site of involvement for coronavirus disease 2019 (COVID-19) [2]. Therefore, it is very important to show radiologically pulmonary involvement. The low specificity could be associated with other etiological factors that can cause similar thorax computer tomography (CT) findings [3]. Although certain thorax CT signs are characteristic of COVID-19, no specific sign is able to completely rule out a diagnosis of COVID-19 [4]. Inconsistency between radiological and clinical findings may also present certain diagnostic challenges. Therefore, laboratory parameters represent a very important tool for predicting the course and progression of COVID-19. Patients with COVID-19 may experience severe pneumonia, acute respiratory distress syndrome (ARDS), and multi-organ failure leading to hospitalization or death [5]. Laboratory parameters or biochemical indexes that can reflect the COVID-19 severity may allow administration of earlier aggressive treatments and reduce mortality. Lymphocyte count, platelet count, albumin, C-reactive protein to albumin (CAR) fibrinogen, procalcitonin, D-dimer, and interleukin-6 (IL-6) have been shown to predict the disease severity in COVID-19 patients [6-10]. Recently, similar benefits for diagnosing and assessing the severity of COVID-19 have been reported for several indexes such as neutrophil to lymphocyte ratio (NLR), platelet to lymphocyte ratio (PLR), lymphocyte to monocyte ratio (LMR), and systemic immune inflammation index (SII) [11-13]. Despite these reports, no single reliable diagnostic and/or prognostic marker is available that can guide clinicians in the management of COVID-19. Thus, widely available, inexpensive, and rapidly measurable biomarkers are warranted for timely clinical decisions. In this study, we aimed to find demographic data, biochemical and haematological parameters of comorbid diseases that may show COVID-19 progression.

Materials and Methods

A total of 403 patients diagnosed with COVID-19 and admitted to intensive care unit (ICU) or chest diseases ward, or treated on an outpatient basis between 1 January 2021 and 31 June 2021 at the Medical Faculty Hospital, Erzincan Binali Yildirim University (EBYU), were retrospectively screened. 109 were excluded due to missing data. 3 patients were excluded due to current treatment with statins and/or fenofibrate. The study was approved by the EBYU Ethics Committee for Clinical Research (2021:10/20). Patients with positive PCR (Polymerase Chain Reaction) test and thoracic CT compatible with COVID-19 pneumonia were included in the study. A control group was formed from volunteers of similar age and gender. Also, a group of subjects with no COVID-19 infection served as controls. Thus, a total of 292 patients and 96 control group participated the study. Data on demographics, comorbid conditions, and laboratory results were retrieved from the hospital's electronic database. Study subjects were divided into four groups as follows: patients admitted to intensive care unit (ICU Group, n=61); patients admitted to chest diseases ward (Inpatient Group, n=201); patients treated on an outpatient basis (Outpatient Group, n=30); and the control group (Control Group, n=96). ICU group consisted of patients with the following characteristics: respiratory rate > 30/min, presence of severe respiratory symptoms, oxygen saturation (SpO2) < 90% at ambient air, PaO2/FiO2 < 200, in addition to requirement for high flow oxygen therapy (HFOT), non-invasive mechanical ventilation (NIMV), or invasive mechanical ventilation (IMV). Subjects in the Inpatient Group had symptoms such as productive cough and myalgia with positive PCR test result, in addition to the presence of radiological signs of COVID-19 pneumonia. Outpatients consisted of those with cough, sputum, myalgia, positive PCR test, with no radiological signs of COVID-19 pneumonia. Age and gender matched subjects who applied to the hospital for other reasons and did not have COVID-19 or comorbidities constituted the control group.

The test results obtained from the first measurements of the patients recorded in the system were evaluated in this study. Venous blood samples were collected after 12 hours of fasting. Fasting total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), triglycerides, albumin, creatine kinase (CK), lactate dehydrogenase (LDH), ferritin, C-reactive protein (CRP), D-dimer, Hematocrit (Htc), neutrophil count, lymphocyte count, monocyte count, and mean red cell distribution width (RDW) at presentation were recorded. The complete blood counts were performed using a Sysmex XN-1000 autoanalyzer (Sysmex Corporation, Kobe, Japan), and biochemical assays were carried out with spectrophotometric methods using an Olympus AU2700 Plus Chemistry Analyzer (Beckman Coulter, Tokyo, Japan). Serum ferritin was determined by chemiluminescence using a Centaur XP device (Siemens Healthcare, Germany). C-reactive protein (CRP) was measured in serum by nephelometric methods using a BN™ II device (Siemens, Munich, Germany). D-dimer were measured from the whole blood with AQT90 flex Radiometer® (Bronshoj, Denmark). Also calculated for each patient were the neutrophil to lymphocyte ratio (NLR), platelet to lymphocyte ratio (PLR), lymphocyte to monocyte ratio (LMR), systemic immune inflammation index (SII: neutrophils × platelets/lymphocytes), monocyte to HDL-C ratio (MHR), C-reactive protein to albumin ratio (CAR: CRP/albumin × 100), and AIP (as the base 10 logarithm of triglyceride to HDL-C ratio).

Exclusion criteria included the presence of connective tissue disorders, hematological disorders, renal or hepatic dysfunction, thyroid disorders, cancer, age < 18 years, pregnancy, albumin transfusion prior to treatment, and use of antifibrotic treatments.

IBM SPSS 22 (Armonk, NY: IBM Corp.) package program was used in statistical analysis of the data. Descriptive statistics for variables were presented as numbers and percentages for categorical variables and average ± standart deviation (FA) for continuous variables. Chi-square test was used in the analysis of categorical data. The suitability of continuous variables to normal distribution was tested by the *Kolmogorov-Smirnov* normality test. One-way ANOVA performed in group comparison. After ANOVA pairwise comparisons were done by using *Bonferroni* post-hoc test. The ROC curve was used to test whether the variables had diagnostic value. Area under roc curve (AUC), *Youden* index, optimum cut-off, sensitivity and speciality values of the optimum cutting point were presented. In all statistical tests, situations with $p < 0.05$ were considered significant.

Results

There were 61, 201, and 30 patients in the ICU, inpatient, and outpatient groups, respectively a total of 96 subjects served as controls. Female and male patients comprised 41% and 59%, 39.8% and 60.2%, and 46.7% and 53.3% of the patients in the ICU, inpatient, and outpatient groups, respectively. Of the control subjects, 43.8% were female and 56.3% were male. Gender distribution was comparable across the study groups ($p = 0.855$). The mean age in ICU, inpatient, outpatient, and control groups was 67.79 ± 13.624, 53.25 ± 19.292, 44.54 ± 12.128, and 50.15 ± 14.375 years, respectively. ICU patients were significantly older as compared to other groups ($p < 0.001$). In our study, cardiovascular disease (CVD), diabetes mellitus (DM), chronic pulmonary disease (CPD) and charlson comorbidity index (CCI) scores were higher in the ICU group compared to other groups ($p < 0.001$) (Figure 1). Also, mean CK, LDH, ferritin, CRP, D-dimer, triglyceride, neutrophil, and RDW were higher among ICU patients than in other groups ($p < 0.001$) (Figure 2, Table 1). However, ICU patients had lower Htc, lymphocyte count, and albumin vs. other groups ($p < 0.001$) (Table 1).

In our study, it was seen that the total-C value in the ICU group is similar to the inpatient group (p = 0.632), but lower than the values in the Outpatient and Control group (p < 0.001). In our study, HDL-C values were similar to the inpatient group and the ICU group (p=0.14). However, HDL-C values in these two groups were lower than in the outpatient and control groups. In addition, in our study, the values in the LDL-C ICU group were lower than other groups (p < 0.001). The triglyceride values were higher in the ICU group than other groups (p < 0.001). Finally, the AIP values in the ICU group were higher compared to other groups (p < 0.001) (Figure 4). When NLR, LMR, PLR, AIP, SII, CAR, and MHR indexes are calculated, ICU patents were found to have higher NLR, PLR, AIP, SII, and CAR (p < 0.001) and lower LMR (p < 0.001) as compared to

Table 1. Laboratory values used in the follow-up of patients with COVID-19 infection

Laboratory Parameters	**ICU Group (n=61)**	**Inpatient Group (n=201)**	**Outpatient Group (n=30)**	**Control Group (n=96)**	***p***
Albumin (g/L)	30.2 ± 5.7	39.8 ± 4.4*	40.6 ± 3*	41.9 ± 3.3*	< 0.001
TC (mg/dL)	175.9 ± 77.53	174.1 ± 49	199.2 ± 39.6*	198.4 ± 42.2*	< 0.001
Triglyceride (mg/dL)	208 ± 106.5	134.4 ± 77*	199 ± 130.8	143.5 ± 93*	< 0.001
HDL-C (mg/dL)	33.8 ± 10	38.4 ± 11.8	45.1 ± 10.3*	47.6 ± 11.8*	< 0.001
LDL-C (mg/dL)	92.3 ± 35.4	108 ± 41*	114 ± 33.4*	125.1 ± 36*	< 0.001
CK (u/L)	265 ± 293.5	168.6 ± 215.4*	117.4 ± 43.4*	138 ± 165.3*	< 0.001
LDH (u/L)	520.1 ± 419	274.2 ± 103.4*	233.4 ± 90*	256.2±82*	< 0.001
WBC (10^3/ mm^3)	11.5 ± 7.5	8.5 ± 3.9*	7.1 ± 2.2*	7.0 ± 2.0*	< 0.001
Htc (%)	35.6 ± 6.3	41.5 ± 4.5*	42.4 ± 3.8*	43.1 ± 3.9*	< 0.001
RDW %	15.2 ± 2.6	13.5 ± 1.8*	13.4 ± 1.6*	13.1 ± 1.0*	< 0.001
PLT (10^3/ µL)	237 ± 113	240 ± 72*	249 ± 676*	277 ± 78*	< 0.001
Lymphocyte (10^3/ µL)	1.20 ± 0.74	1.86 ± 0.83*	2.11 ± 0.86*	2.19 ± 0.70*	< 0.001
Monocytes (10^3/ µL)	0.93 ± 1.50	0.68 ± 0.31	0.55±0.20	0.52±0.19	< 0.001
Neutrophil (10^3/ µL)	7.82 ± 5.32	4.04 ± 2.01*	4.48 ± 1.69*	4.10 ± 1.59*	< 0.001
Ferritin (ng/mL)	680.8 ± 527.5	231.8 ± 293.8	187.7 ± 308	111 ± 79.8*	< 0.001
Fibrinogen (mg/dL)	313.9±113.9	351.6±81.7*	296±78.6*	263.2±64.8*	< 0.001
CRP (mg/L)	72.7 ± 61.40	35.6 ± 45.1*	6.0 ± 7.5*	3.5 ± 3.1*	< 0.001
D-dimer (µg/L)	3829 ± 6891	1885 ± 6995*	446 ± 291*	359 ± 144*	< 0.001
AIP	6.59 ± 4.0	3.81 ± 2.49*	4.75 ± 3.39*	3.33 ± 2.48*	< 0.001
SII	2281.4 ± 2570.2	664.6 ± 694.8*	584.0 ± 327.7*	557.1 ± 309.3*	< 0.001
CAR	2.684 ± 2.687	0.942 ± 1.276*	0.150 ± 0.194*	0.084 ± 0.076*	< 0.001
MHR	0.032 ± 0.06	0.019 ± 0.011*	0.013 ± 0.006*	0.012 ± 0.005*	< 0.001
NLR	10.17 ± 10.85	2.78 ± 2.73*	2.31 ± 1.08*	2.02 ± 1.04*	< 0.001
LMR	2.68 ± 2.22	3.167 ± 1.70*	3.93 ± 1.09*	4.52 ± 1.46*	< 0.001
PLR	265.5 ± 187.2	158.4 ± 112.6*	134.3 ± 62.7*	135.2 ± 44.3*	< 0.001

*Statistically significant difference was found when compared to intensive care (p<0.05)

Abbreviations: *TC, total cholesterol; HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; CK, creatinine kinase; LDH, lactate dehydrogenase; WBC, white blood cell; Htc, Hematocrit; RDW, mean red cell distribution width; PLT, Platelets; CRP, C-reactive protein; AIP, Atherogenic index of plasma; SII, Systemic immun inflammatory index; CAR, C-reactive protein to albumin ratio; MHR, monocyte to HDL-C ratio; NLR, Neutrophil to lymphocyte ratio; LMR, Lymphocyte to monocyte ratio; PLR, Platelet to lymphocyte ratio.*

other groups (Figure 4). Also, ICU and inpatient groups had higher MHR than in outpatient and control groups ($p < 0.001$). MHR was found to be a significant predictor of hospitalization. An assessment of the diagnostic accuracy of NLR, LMR, PLR, AIP, SII, and CAR indexes indicated that SII, NLR, AIP, and CAR were significant predictors of ICU admission (Figure 5A), while LMR and PLR were not statistically significant predictors of ICU admission. Table 2 shows the sensitivity and specificity of NLR, AIP, SII, and CAR for predicting ICU admission, and Figure 5A shows the ROC curve analysis. Figure 5B shows an area under the ROC curve analysis of the sensitivity and specificity of MHR for hospitalization.

Discussion

COVID-19 remains a major global cause of morbidity and mortality with high rates of transmission. Increasing clinical evidence also shows that the most common comorbidities associated with poor prognosis and higher mortality rates in COVID-19 patients include systemic hypertension (HT), DM, and obesity. In our study, CVD, DM, CPD diseases and CCI scores were higher in the ICU group compared to other groups. However, patients with additional

Tablo 2. CAR, AIP, SII, and NLR values are observed in patients diagnosed with COVID-19 Pneumonia and treated in an outpatient setting in the intensive care unit, chest diseases department.

Indexes	AUC	95%CI for AUC	*p*-value	Optimum cut-off	Youden Index	Sensitivity (%)	Specificity (%)
SII	0.756	(0.674-0.838)	<0.001	960.6	0.48	62.3	85.7
NLR	0.816	(0.751 -0.882)	<0.001	3.91	0.51	65.6	85.7
AIP	0.740	(0.670-0.810)	<0.001	0.32	0.39	63.9	75.8
CAR	0.762	(0.693-0.832)	<0.001	1.11	0.43	65.6	77.5

Abbreviations: *CAR, C-reactive protein to albumin ratio; AIP, Atherogenic index of plasma; SII ,Systemic immun inflammatory index; NLR, Neutrophil to lymphocyte ratio.*

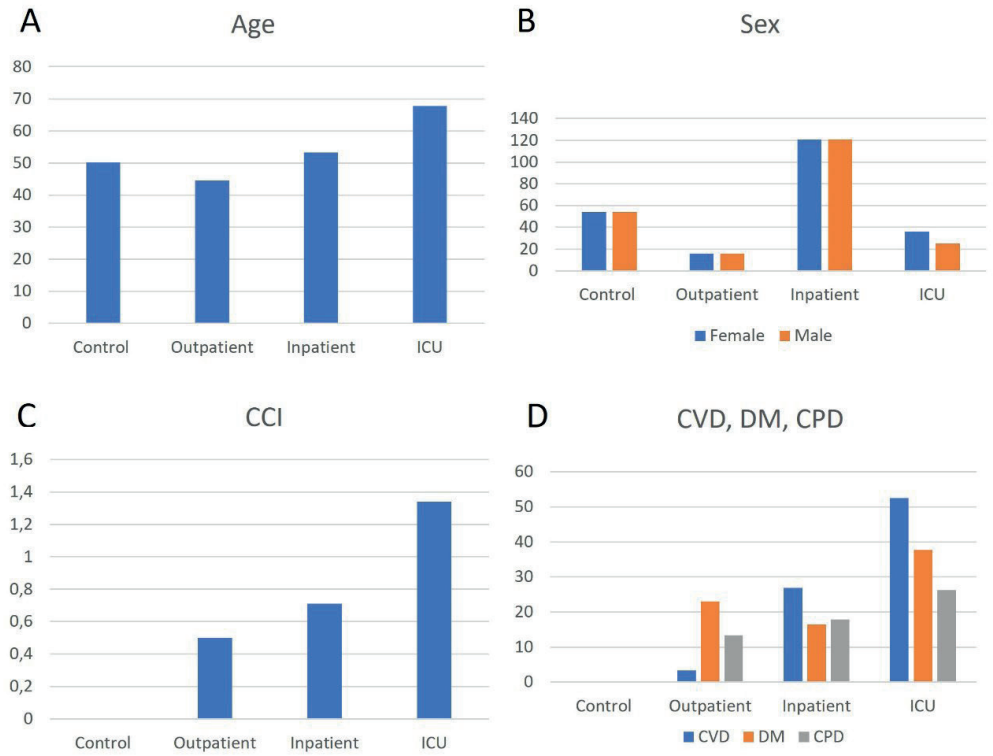

Figure 1. Shows the distribution of A: Age, B: Gender, C: CCI (charlson comorbidity index) and D: CVD, DM, CPD by groups. (CVD, cardiovascular disease; DM, diabetes mellitus; CPD, chronic pulmonary diseases)

infection or pulmonary thrombolysis were not included in the study.

Unfortunately no practical, rapid, and reliable tests are available for the diagnosis of this condition. Thus, more practical and available routine laboratory tests are required both for the diagnosis and prognosis prediction. Our results showed that a significant proportion of our patients experienced alterations in their routine laboratory tests that were more pronounced among patients admitted to an ICU. Fundamental pathophysiological mechanisms of multi-organ damage secondary to COVID-19 infection include direct viral toxicity, endothelial injury, thrombo-inflammation, dysregulation of

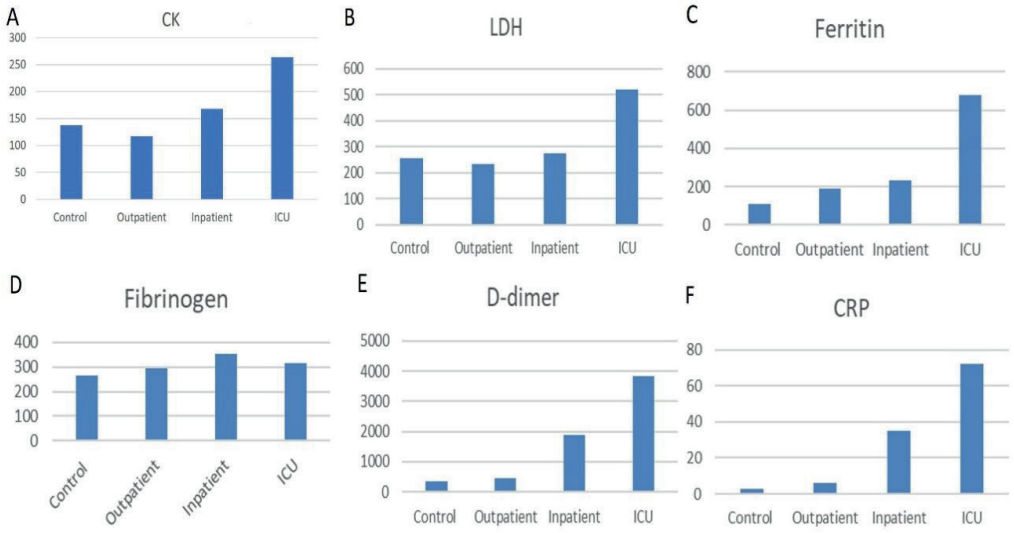

Figure 2. Distribution of A: CK, B: LDH, C: Ferritin, D: Fibrinogen, E: D-dimer, F: CRP according to groups is observed. (CK, creatinine kinase (μ/L); LDH, lactate dehydrogenase (μ/L), Ferritin (ng/ml), Fibrinogen (mg/dl), D-dimer (μg/L) CRP, C-reactive protein (mg/L)).

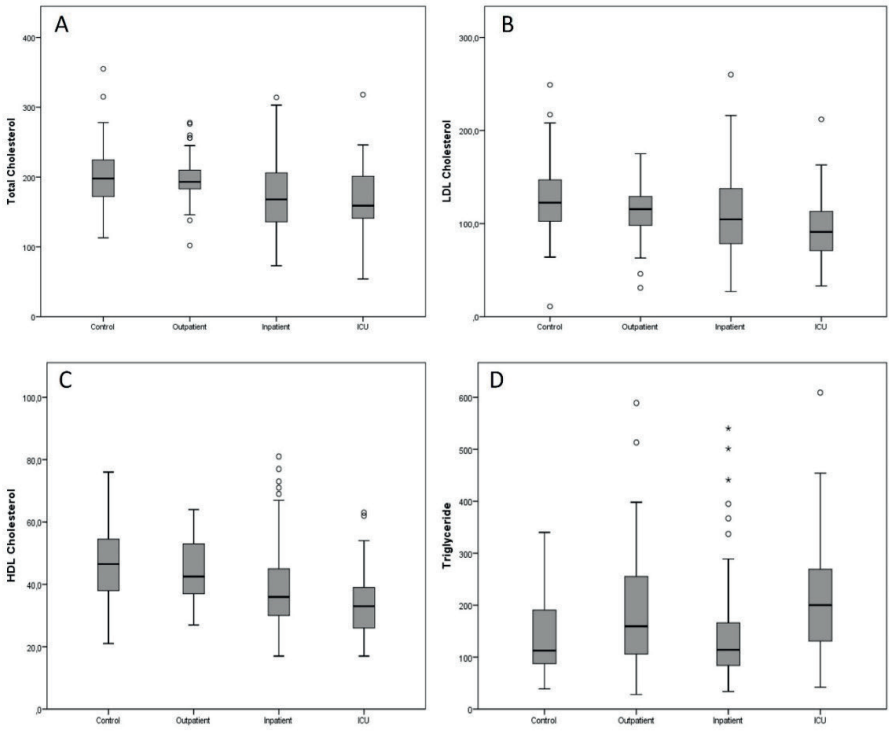

Figure 3. A: Total cholesterol (mg/dL), B: LDL-cholesterol (mg/dL), C: HDL-cholesterol (mg/dL) and D: Triglyceride (mg/dL) groups according to the distribution.

the immune responses, and dysregulation of the renin-angiotensin-aldosterone (RAAS) system [14]. It is highly probable that endothelitis, endothelial injury, endothelial cell dysfunction, and impaired micro-circulation in different vascular beds may contribute significantly to life-threatening complications of COVID-19, such as venous thromboembolic disease [15]. It appears that endothelial dysfunction plays a determinative role in the progression of COVID-19 [16]. Previously, elevated MHR has been shown to be associated with systemic inflammation and endothelial dysfunction, and has been proposed to be a prognostic marker for cardiovascular disorders [17-20]. In our study, ICU and inpatient treatment groups had higher MHR as compared to outpatients and control subjects ($p < 0.001$). Also, MHR emerged as a significant predictor of hospital admission. The height of the MHR index may be due to older,

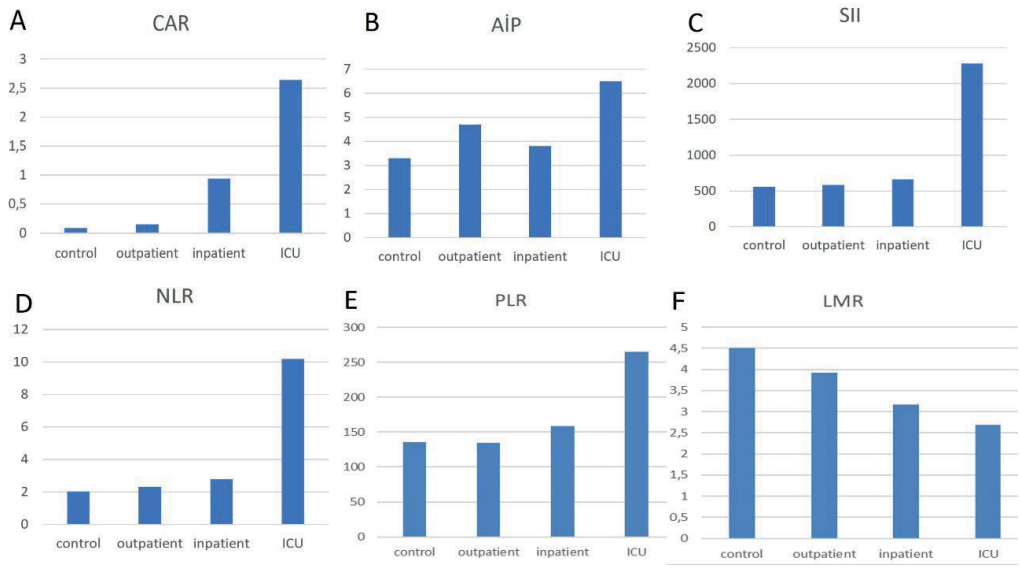

Figure 4. A: CAR, C-reactive protein to albumin ratio, B: AIP, Atherogenic index of plasma, C: SII, Systemic immun inflammatory index; D: NLR, Neutrophil to lymphocyte ratio; E: PLR, platelet to lymphocyte ratio F: LMR, Lymphocyte to monocyte ratio; shows the distribution according to groups.

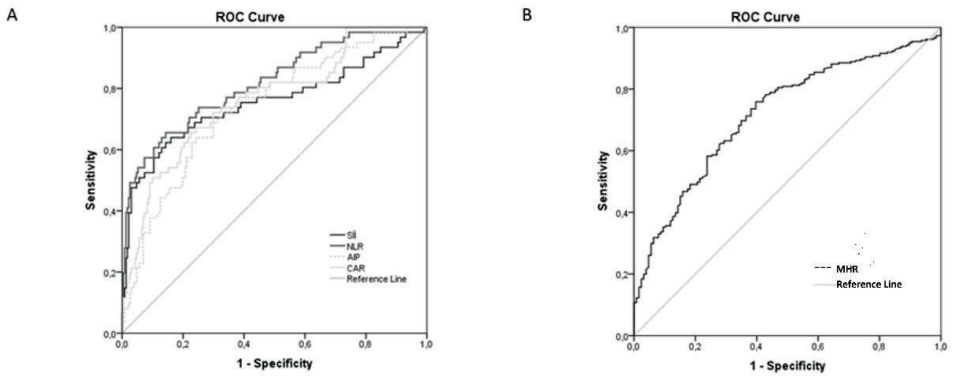

Figure 5. A: When the diagnostic accuracy of indexes were evaluated, AIP SII, CAR and NLR were found significant for determining B: The diagnostic value of the monocyte to HDL-C ratio (MHR) index was tested to determine hospitalization (ICU+Inpatient) and it was found to be significant in determining hospitalization ($p<0.001$). The area under the curve was found to have an AUC of: 0.719 (95%CI: 0.667-0.772). The diagnostic cut-off value for hospitalization was calculated as 11.6 (sens: 75.9%; spec: 60.3%). ICU admission (Table 2 and ROC curve).

Abbreviations: *AIP, Atherogenic index of plasma; SII, Systemic immun inflammatory index; CAR, C-reactive protein to albumin ratio; NLR, Neutrophil to lymphocyte ratio; MHR, monocyte to HDL-C ratio; HDL-C, high density lipoprotein cholesterol.*

DM and CVD patients in the ICU group, and may show poor prognosis. In a similar way in our study, it was seen that the most common comorbidities in patients with COVID-19 were diagnosed in patients with COVID-19 were found to be hypertension and diabetes mellitus diseases [21]. It has been reported that a progressive increase in RDW occurs in correlation with the severity of COVID-19 infection. On the basis of this information, it has been suggested that RDW should be a part of routine laboratory assessments and monitoring of COVID-19 patients [22]. Similar to previous observations, our ICU patients had higher RDW as compared to other groups. Systemic immune inflammation index (SII), estimated using the parameters of neutrophil, platelet, and lymphocyte counts, is a marker for the systemic inflammation, and may be utilized to predict poor prognosis in cardiovascular disorders [23]. Recent observations suggest that COVID-19 patients may have significant elevation of SII as compared to healthy controls, indicating a potential diagnostic role in these patients [11]. It appears that SII may be a particular marker of respiratory injury in COVID-19 patients, rather than a general impairment due to comorbidities [24]. In our study, patients admitted to the ICU also had higher SII than other groups ($p < 0.001$), with an additional role to predict the ICU admission. As stated earlier, these findings suggest that elevated SII in COVID-19 patients may be an indicator of poor prognosis. While neutrophils mediate the innate immune responses mainly involving the production of mediators, lymphocytes mediate the adaptive immune responses via regulation of inflammation [25]. Lymphopenia and neutrophilia are common hematological abnormalities in COVID-19 patients and also have been found to be significant predictors of disease severity and poor prognosis. In a recent study, Nalbant et al. showed that NLR index, which may be readily calculated by dividing neutrophil count to lymphocyte count, is an independent predictor of a diagnosis of COVID-19 infection [26]. Also, other studies suggest that NLR index may be closely associated with the course of COVID-19 infection [27]. In our study, ICU patients had higher NLR as compared to other groups. Also, NLR index was previously reported to be a significant predictor of ICU admission. LMR was proposed as an inflammatory marker with prognostic and predictive values [28, 29]. LMR measurements may have a prognostic value also in COVID-19 patients. Accordingly, our ICU patients had lower LMR values than other groups. Recently, PLR has emerged as an inflammatory marker that could predict the adverse outcomes in patients with CVD [30-32]. Also, Qu R. et al. reported that PLR could be used as a predictor of mortality in COVID-19 patients [33]. In the current study, ICU patients had higher PLR values as compared to other study groups. Hypercoagulation and dissemine intravascular coagulopathy (DIC) can be seen in some viral infections [34]. Grillet et al. detected the presence of acute pulmonary embolism in 23% of the patients with COVID-19 pneumonia [35]. Hypercoagulation may also be associated with hyperinflammatory responses. Also, acute pulmonary edema may occur in critically ill COVID-19 patients who have occlusion of the smaller pulmonary vessels and micro-thrombi [36]. Significantly increased fibrinogen and D-dimer levels may reflect a worse prognosis [37, 38]. In our study, ICU patients had higher D-dimer levels than other groups. CRP is a positive acute phase reactant that increases in infections, inflammation, and in response to tissue injury [39]. It has been reported that CRP may be elevated without any CT findings in some cases of severe COVID-19 infection, hence its proposed role as an early marker of severe disease [40]. It has been reported that there is a positive correlation between CRP levels and the diameter of the lung lesion and that CRP indicates disease severity [41]. In the current study, patients admitted to an ICU had higher CRP levels than in other subjects. Albumin is a negative acute phase reactant that tends to decrease in response to conditions such as inflammation, trauma, surgery, and burns [42]. Inflammation decreases albumin synthesis via IL-6 and TNF-α and increases the catabolism, leading to reduced serum albumin [43,44]. In hospitalized COVID-19 patients, an induced cytokine storm may lead to hypoalbuminemia, with an eventually elevated risk of mortality.

Low albumin levels may predict the course of the disease irrespective of other markers [45,46]. In our study, patients admitted to ICU had lower albumin levels than other groups. CAR can be estimated using only two laboratory parameters that are widely available, and therefore it can be used as a simple, practical, and inexpensive prognostic marker of disease severity in COVID-19. Furthermore, CAR can be used as a marker of pro-inflammation, which is closely linked with pro-thrombotic states. In patients with higher thrombotic burden, elevated CAR levels have been observed. In contrast with assessments performed using albumin and CRP separately, CAR may be a more reliable bio-marker of disease severity and prognosis [47]. In recent years, it has emerged as a useful prognostic factor to predict mortality in patients with sepsis, septic shock, or in critically ill subjects [48-50]. CAR is independent risk factors that can forecast how severe the patients COVID-19 disease will progress [51]. Zeynep et al. looked at LDH/albumin, CRP/albumin, and urea/albumin levels in COVID-19 patients and showed that these 3 indices can predict poor prognosis and may be effective in deciding to transfer these patients to the intensive care unit [52]. In line with these previous publications, our ICU patients had higher CAR index values than other patient groups. Also, CAR emerged as a significant predictor of ICU admission. In patients with COVID-19, myocardial injury, myocarditis, and cardiac failure may occur, and acute myocardial infarction may develop as a result of hypercoagulability [53-55]. High triglyceride and low HDL-C levels are known to be associated with cardiovascular disorders [56]. AIP combines these two risk factors, and has been found to be associated with atherosclerosis, CVD, DM, HT, vascular disorders, and endothelial injury [56-59]. All viruses of the Coronaviridae family require host cells for viral replication, which leads to increased host metabolism in order to combat the virus [54]. Yan et al. showed that viruses can modulate the lipid metabolism of the host to obtain optimal viral replication [60]. Huang et al. showed a higher viral load among patients who died during the COVID-19 pandemic, suggesting that total cholesterol, LDL-C, and HDL-C could be reduced due to this reason [61]. Also, elevated triglycerides were associated with increased mortality. In the current study, total cholesterol levels in ICU patients were comparable to those in the inpatient treatment group, although they were lower as compared to outpatients and control subjects. Similar to total cholesterol, HDL-C was comparable between ICU and inpatient groups, both of whom had lower HDL-C than outpatients and controls. Furthermore, LDL-C among ICU patients was significantly lower than in other patient groups, while triglycerides were higher in the ICU patients as compared to other patient groups. Based on these observations, it may be proposed that elevated AIP may be associated with increasing viral load and poor prognosis in COVID-19 patients.

Our study had some limitations. This was a single-center retrospective study. Also, confounding factors for laboratory results such as cigarette smoking, alcohol use, and body mass index were not taken into consideration. Further multi-center studies with larger patient populations are required to reinforce our observations.

Conclusion

In our study, patients in the ICU group were older and had higher number of comorbid conditions (particularly DM, CVD, and CPD). Obviously, closer monitoring of patients with comorbid conditions would be an appropriate clinical approach, as such conditions may have a negative impact on the prognosis. Clinical and laboratory data bear significant clinical importance, particularly in the management of patients admitted to ICUs. As a result, indexes such as AIP, SII, CAR, NLR, LMR, PLR and MHR calculated in COVID-19 patients can help predict poor prognosis. However, multi-center, randomized, controlled studies with larger sample size are warranted to reach firmer conclusions regarding the utility of these parameters and indexes.

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Conflict of Interest

The authors declare that there are no conflict of interests.

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ORIGINAL ARTICLE

Rising health problem of Türkiye, healthcare professionals' suicides in media

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Abstract

It is known that the risk of suicide increases in professionals who are frequently exposed to intensive and stressful working conditions. Health professionals may be susceptible to depression and suicide due to occupational stressors besides risk factors such as violence against healthcare professionals, mobbing and burnout. However, it is noteworthy that there is no institutional data or statistics regarding suicides of healthcare professionals, in Türkiye. In this context, we aimed to reveal sociodemographic characteristics and risk factors related to suicides of health workers by evaluation cases subjected to media. Due to the lack of detailed institutional data, we investigated national media releases and reports between 01/01/2010 and 31/12/2020 in order to extract data regarding suicides of healthcare professionals. Obtained data was discussed in the light of the related literature. During the study period, a total of 138 healthcare professionals were reported to have committed suicide, out of which 69 (50%) were male and 69 (50%) were female. The mean age of the presented cases was 34.79 years. It was determined that 68 (48.28%) victims were medical doctors, and the most frequent suicide method was drug intoxication with a rate of 36.23% (n=50). Health workers' suicides and dynamics have not been fully revealed and have not been studied sufficiently. In this regard, health policies and a professional approach need to be developed in the light of the information obtained through joint studies by Ministry of Health and Associations/Organizations of Healthcare professionals.

Keywords: Healthcare professional, suicidal risk factors, suicide, burnout, media

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Introduction

Suicide is defined as an action taken with the intent to kill oneself, done with knowing that it would end in death, and either chosen or caused directly or indirectly by an action to which the deceased person is passively exposed [1-3]. When the data on suicide cases in Türkiye recorded between 2001 and 2019 are examined, it is seen that the suicide rate has been around 4 per hundred thousand, however in the evaluation of suicide by gender, it has been reported that men commit suicide approximately 2.4 times more frequently than women in these ten-year period [4].

Although there is different information in the conducted studies, there are studies in the literature that show that working in a fixed job and a regular financial income reduce the risk of suicide. However, it has also been reported that the risk of suicide is increased in some occupational groups such as soldiers, police officers and healthcare professionals, who are known to be exposed to intense and stressful working conditions more frequently [5]. In addition, it is considered that healthcare professionals with high labor intensity, apart from the stress situation that arises due to the nature of their work, can also push people to depression and suicide due to depressive situations such as violence against the healthcare worker, mobbing and burnout [6,7]. However, it is noteworthy that due to the lack of detailed institutional data on the characteristics of healthcare professional suicide cases, occupation-specific suicide risk factors could not be identified, and adequate prevention studies could not be conducted. In this context, the aim of this study is to evaluate the cases of suicide committed by healthcare professionals and reflected in national media, in order to discuss the frequency of suicide and risk factors that may lead healthcare professionals to commit suicide and to offer solutions.

Materials and Methods

There is no institutional data presentation conducted to obtain data on the deaths of healthcare professionals. In our country, the data obtained from the Turkish Statistical Institute (TurkStat) and the autopsy statistics of the Council for Forensic Medicine do not contain specific data on healthcare professional deaths and in particular on healthcare professional suicides. In addition, there is no data on the deaths of healthcare professionals reported by the Ministry of Health and in the archives of healthcare professional organizations. At this point, by using the "document analysis" research method, news published in visual and printed media organs operating on a national basis was scanned and data on suicide cases of healthcare professionals reflected in the media was obtained.

In this study, healthcare professionals who were reported to have committed suicide, between 01/01/2010 and 31/12/2020, were investigated and recorded in which branch of the health sector they were employed, their age and if determined, the causes and methods of suicide with the document analysis method. Cases with unknown, suspicious or undetermined manner of death were excluded. It was determined that a total of 138 healthcare professional suicides were reflected in media reports between the specified dates. The obtained data were discussed in the light of literature findings.

Results

It was observed that 69 (50%) of 138 healthcare workers were male and 69 (50%) were female, which were reflected in the media reports that he committed suicide during the specified time interval. The average age of the presented cases was calculated as 34.79 years (SD = 10.51) (Table 1). It was observed that 68 (49.28%) of 138 cases of healthcare professionals were medical doctors. The distribution of the cases according to the professions is shown in Table 1.

Among the methods chosen by healthcare professionals to commit suicide, drug intoxication comes first with a rate of 36.23% (n=50). Drug intoxications are followed in frequency by jumping from height, hanging, firearm wounds, stab wounds (Figure 1).

When the distribution of the number of healthcare professional suicide cases reflected in the media is examined by years, it is seen that while 11 cases of suicide were detected in 2010, 3 of whom were medical doctors, and 24 cases, 10

of whom were physicians, committed suicide in 2020 (Figure 2).

Although there is information for only 46 (33.33%) cases about the factors that push healthcare professionals to suicide in the media news that were scanned, it was stated that 21 (15.22%) of the cases had a previously known diagnosis of depression. The distribution of the factors stated as the underlying reason for suicide by the media organ is shown in Figure 3.

Discussion

According to TurkStat data, it is seen that the frequency of suicides is close to horizontal in the entire Turkish population, but in the light of the data obtained in our study, it is noted that the number of suicides seen in healthcare professionals has increased especially in recent years [4]. Just as the reasons for this relative increase among health workers need to be investigated, whether the frequency of suicide among health workers is more frequent in Turkish society than in the rest of society and/or other professional groups is another issue that needs to be investigated. Since the causes of death and the issues related to deaths are not examined in the TurkStat data in relation with the professions, it is of great importance to carry out descriptive studies in this regard. When the literature on the subject is examined, it is reported that the frequency of suicide in both medical doctors and other healthcare professionals has increased compared to those of employees in other occupational groups, and this increase is more pronounced in women [8-11].

As a result of a petition by a Member of Parliament that contains questions about healthcare professionals who have committed suicide in the last five years back from 2018, the number of health worker suicides for 2015, 2016, and 2017 has been investigated and presented by the Ministry of Health. According to this data, 180 healthcare professionals including 10 medical doctors in 2015, 129 healthcare professionals including 11 medical doctors in 2016, 122 healthcare professionals including 3 medical doctors in 2017 have committed suicide. In three

Table 1. Data about age at death, sex and profession of cases.

Age at Death	*Minimum*	19 years		
	Maximum	70 years		
	Mean	37.79 years		
	SD	10.51 years		
Sex	*Male*	n=69	50%	
	Female	n=69	50%	
	Total	n=138	100%	
Profession	*Medical Doctor*	n=68	49.28%	
		Academician	n=4	2.9%
		Resident	n=12	8.7%
		General practitioner	n=14	10.14%
		Specialist	n=38	27.54%
	Dentist	n=6	4.35%	
	Midwife	n=2	1.45%	
	Nurse	n=48	34.78%	
	Healthcare Officer	n=4	2.9%	
	Healthcare Technician	n=10	7.25%	
	Total	n=138	100%	

years of time interval between 2015 and 2017, 431 healthcare professionals including 24 medical doctors have committed suicide. However, the source of this data presentation and the age, gender, occupation, division, cause of suicide, method of suicide, institution where he worked, and medical history etc. other important details have not been shared by the Ministry of Health. If the accuracy of the numerical data of the Ministry of Health is accepted, it is observed that only 4% of the healthcare professional suicides that occurred in the mentioned three-year interval were covered by the media. In addition, when the data were compared, it was seen that 70.83% of medical doctor suicides and 0.05% of other healthcare professional suicides were featured in the media as news. This finding shows that medical doctor suicides can find a greater place in the media than other health-related occupations.

It seems possible to say that male gender is dominant in suicide cases [12]. This situation is clearly reflected also in TurkStat statistic reports [4]. However, in studies conducted on medical doctors, it is seen that suicide rates of female and male physicians are close to each

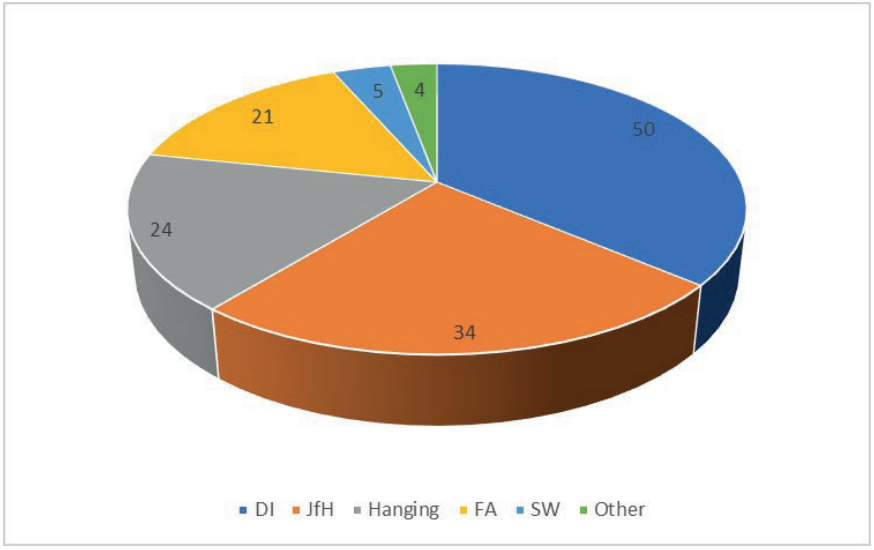

Figure 1. Distribution of suicide methods preferred by the subjects (DI: drug intoxication, JfH: jump from height, FA: firearm, SW: stab wounds).

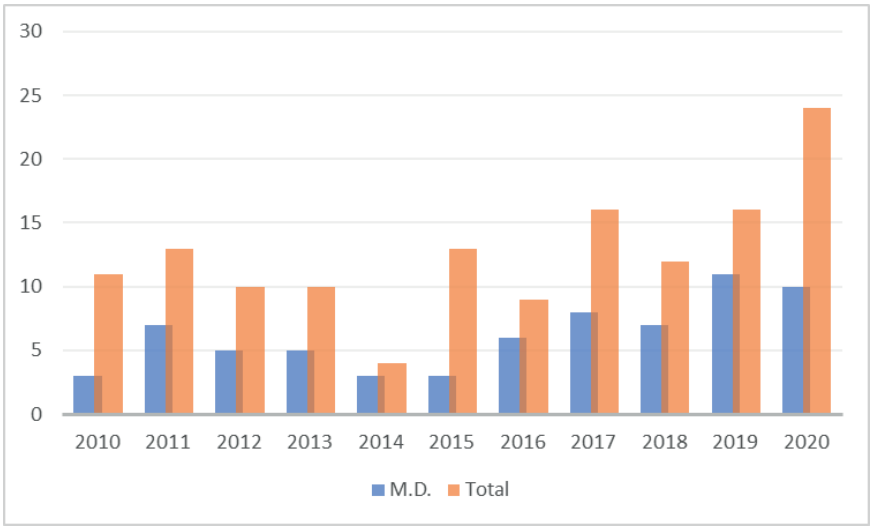

Figure 2. Number of healthcare professional suicides reflected in the national media by years (M.D.: Medical doctors).

other in the corrections made considering the low number of female employees, even though males are superior in number in physicians who commit suicide [8-10]. In the present study, it was determined that the data on suicide cases that took place in the media were similar to the literature.

As a result of the document analysis we conducted, it is seen that the average age of healthcare professionals reflected in the media as suicide cases is 34.79 years (SD=10.51). In a study conducted in Australia that investigated the suicides of healthcare workers between 2001 and 2012 [11], it is seen that the average age of medical doctors who died as a result of suicide is 44.7 years, the average age of nurses and midwives is 44.1 years, and the average age of other healthcare professionals is 40.3 years. In a systematic review examining medical doctor suicides that occurred in Britain [9], medical doctor suicides appear to have increased significantly in individuals between the ages of 40 and 49. When compared with these data, although the data in our study are limited, it is one of the predictable results that the age of suicide in healthcare workers is relatively low in Türkiye.

In a study by Milner et al. [11], it is stated that drug intoxication increases significantly as a method of suicide in healthcare professionals who have easy access to drugs. Unfortunately, since our study did not have enough data about the phenomena to create statistical significance, an evaluation could not be made on this issue. However, in the light of the data obtained, the most common suicide method used in our cases is drug intoxication, which is consistent with the literature. When the population of the whole country is considered, it is seen that the most frequently used suicide method in Türkiye is hanging [4]. However, hanging was the third most common method among the cases included in our study.

According to official statistics recorded between 2001 and 2019 in Türkiye, it has been determined that the most common factor causing suicide is mental disorders [4]. Although it has been observed that many of the suicide cases that we have scanned from the media news do not include factors that can push the cases to suicide, depression is the most common factor that can lead to suicide. Diagnosis of depression, which is one of the main risk factors on the road to suicide [13], it is seen that 21 (15.22%) of 46 cases, who we could find information about risk factors, have a previously known depression diagnosis. Considering that suicide is seen more frequently in healthcare professionals, it becomes necessary to follow healthcare professionals who are diagnosed with a major risk factor for suicide, such as depression, more closely. It is thought that establishing such a follow-up system by both the Ministry of Health and healthcare professionals' organizations and trade unions of healthcare professionals may be beneficial in

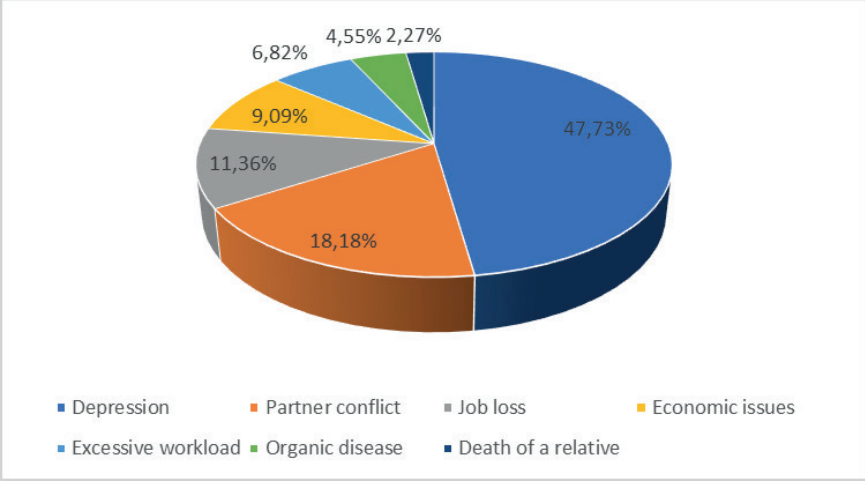

Figure 3. The distribution of the factors stated as the underlying reason for suicide in healthcare professional suicide cases.

reducing these deaths.

In healthcare professionals, it is known that, apart from the stress situation that arises due to the nature of the profession with high labor intensity, suppressive situations such as "mobbing" and "burnout" can push people to depression and suicide [6,7]. Consistent with this information, it is noteworthy that two cases included in our study had alleged mobbing. In Türkiye and in the world, many health institutions have been establishing anti-mobbing boards in order to detect mobbing cases and to prevent possible victimization. However, the fact that healthcare professionals still experiencing mobbing, which accelerates professional alienation and is a risk factor on the road to suicide, shows that the studies conducted are not sufficient yet. Job loss/unemployment are among the known risk factors for suicide. In this context, suicides seen as a result of job insecurity, dismissal/leaving and unemployment among physicians and healthcare professionals are among the problems that we may face in the coming days [14]. It is seen that five cases in our study committed suicide after being dismissed from the profession. In these cases, it is thought that it will be beneficial to have support programs for professional organizations and professional solidarity organizations and to direct people to professional help, when necessary, in order to prevent suicide.

Conclusion

The suicides of healthcare professionals appear to be a subject whose dynamics have not been fully revealed in our country and has not been studied sufficiently. The fact that institutions or organizations in Türkiye do not have a unit where they examine suicides of healthcare professionals or store statistical information causes inadequacy in identifying and intervening in the factors that push healthcare workers to suicide, and it also constitutes the greatest limitation of this study. In our study, the main limitation is the inability to reach every information in every case and the irregularity of the data, since the information was obtained by scanning the media news archives. It is necessary to establish an infrastructure in this regard, to record the suicides of healthcare workers in a common data pool by performing psychological autopsies, and to establish health policies and professional support programs in the light of the information obtained from this data pool. In this regard, professional organizations, Ministry of Health unit administrators should develop solution-oriented policies by determining the situation in healthcare professional suicides and implement these policies.

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Conflict of Interest

There is no conflict of interest between the authors concerning the materials or methods used in this study or the findings specified in this paper.

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ORIGINAL ARTICLE

Tracheal intubation is not difficult with flexible bronchoscopy guidance

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Abstract

We aimed to evaluate the efficacy and safety of flexible bronchoscopy-guided tracheal intubation during difficult airways. We retrospectively evaluated the hospital records of intubated patients with the assistance of a flexible bronchoscope during 5 years-period, (between January 2015 to 2020). All patients were intubated under general anesthesia. A total of 67 patients were enrolled in the study. The majority of the patients were male (n=42, 62.7%). The mean age was 55.5±15.3 years. *Mallampati* classification was revealed frequently in class IV in 76.1% of cases. Only one patient with class II is evaluated as having a difficult airway because of obesity. The most frequent 3 indications for endotracheal tube (ETT) insertion (intubation) with the help of a bronchoscope were limitation of the mouth opening (40.3%), obesity (20.9%), and cervical-vertebrate fracture (11.9%). The intubation route was preferred as the oral way in 53 patients and the nasal way in 14 patients. The mean duration for ETT intubation via bronchoscopy guidance was 3.38 minutes. There was no severe complication other than transient oxygen desaturation (SaO2) below 90% (n=8, 11.9%) and epistaxis (n=2, 3%) in the complication records of all patients. Intubation with the help of a flexible bronchoscope is an effective, practical, and safe method in patients with a difficult airway.

Keywords: Bronchoscopy, difficult airway, endotracheal intubation, nasal intubation, nasotracheal intubation

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Introduction

The difficult airway is depicted as the clinical situation in which a trained physician (e.g. anesthetist, emergency medicine specialist, pulmonologist, and intensive care specialist) encounters difficulty with mask ventilation and tracheal intubation via laryngoscopic examination of the upper airway [1]. Consequences of a difficult airway encompass more severe outcomes such as respiratory failure (Type 1 and Type 2), airway perforation due to the compulsive effort, metabolic alterations, neurological sequelae, and even decease of the patient [2]. The incidence of difficult intubation varies from 1.5% to 10% of cases taken up for surgery under general anesthesia or mechanical ventilation in intensive care units [2,3]. There are some devices (e.g. classical laryngoscope, videolaryngoscope) and procedures like retrograde intubation for achieving successful tracheal intubation. Unlike these procedures, fiberoptic bronchoscope-guided intubation is a very common and effective method. In this study, we aimed to evaluate the efficacy and safety of fiberoptic flexible bronchoscope-guided tracheal intubation.

Materials and Methods

The study was designed as a retrospective cross-sectional study. All patients who were intubated with the help of fiberoptic flexible bronchoscopy during 5 years' period (between January 2016 to 2020) were enrolled in this study. This study was approved by the Clinical Investigations Ethical Committee of Afyonkarahisar Health Sciences University with the number of 2021/383.

Patient Selection

Difficult airway diagnosis and patient selection were made depending on American Society of Anesthesiologists guidelines. Data of patients including age, gender, modified *Mallampati* classification score (Figure 1) (Class I: soft palate, fauces, uvula, pillars; Class II: soft palate, fauces, uvula; Class III: soft palate, base of uvula; Class IV: soft palate not visible at all [4,5], indications of intubation, type and size of intubation tube, efficacy, and complications were collected from hospital medical records.

Intubation Procedure via Bronchoscopy:

All patients were intubated with the help of a fiberoptic flexible bronchoscope by an experienced bronchoscopist. During the intubation procedure, the bronchoscopist stood at the head side of the patients who were lying down in the supine position. Sedation for all patients was achieved by midazolam (0.02-0.05 mg/kg, intravenous (IV)), rocuronium (0.5 mg/kg, IV, just before the insertion of the bronchoscope into the airway) and propofol (as need, 1-2 mg/kg, IV). Oxygen saturation (SpO2) was maintained above 90% by oxygen supplementation. After lubrication of the outer surface of the distal end of the bronchoscope (Olympus® fiberoptic

Figure 1. Modified *Mallampati* Classification [4].

bronchoscope (BF-1T30) with an external diameter of 4.9 mm), an endotracheal tube (ETT) was slipped over the bronchoscope till to the proximal end. According to the operation type or ventilation needs bronchoscope was inserted through the nasal or oral route to the larynx and then the trachea. During these passages, topical anesthesia of the oropharynx and larynx was performed with the instillation of 1% lidocaine via the working channel of the bronchoscope. After reaching the distal part of the tracheal rings, ETT was advanced over the bronchoscope to the trachea and placed 2 or 3 cm proximally from the main carina. Subsequently, the cuff was inflated to stabilize the ETT to the trachea. All video records of the bronchoscopy-guided intubation procedures were recorded via MedGate® MobilStation. Duration time of intubation was obtained and noted in the bronchoscopy report after re-watching the video record starting from the entrance of the passage (oral or nasal) to advancing the ETT through the tracheal lumen.

Data Collection

All patients' data including, age, gender, indications for difficult intubations, emergency situation, *Mallampati* Classification, intubation route, size and type of ETT, duration, and complications of the procedures were collected from hospital medical records and bronchoscopy reports.

Statistical Analysis

All data were collected, analyzed using Microsoft for Excel version 2013, and tabulated. Data were presented using descriptive statistics. Continuous variables were expressed as mean ± standard deviation (SD) and categorical variables were given as a number (n) and percentage (%).

Table 1. Demographic data, indications of difficult airway and surgical branches (n=67 patients)

	n	%
Gender		
Male	42	62.7
Female	25	37.3
Age, years, Mean±Standard Deviation (min-max)	55.5 ± 15.3 (18-86)	
Implementation Place		
Operation room	62	92.5
Intensive care unit	3	4.5
Emergency room	1	1.5
Bronchoscopy suit	1	1.5
***Mallampati* Classification**		
Class II	1	1.5
Class III	15	22.4
Class IV	51	76.1
Indication for difficult airway		
Limitation of the mouth opening	27	40.3
Obesity	14	20.9
Cervical vertebrate fracture	8	11.9
Facial trauma(maxillary or mandibular fractures)	5	7.5
Cervical immobility/ankyloses	3	4.5
Retropharyngeal abscess	2	3
Temporomandibular joint ankylosis	2	3
Larynx tumor	2	3
Tracheal compression (Huge goiter/mediastinal mass)	2	3
Mandibular mass/abscess	1	1.5
Bronchial rupture	1	1.5
Surgical branches, N=64		
Neurosurgery	14	21.9
General Surgery	13	20.3
Obstetrics and Gynecology	10	15.6
Orthopedics	9	14.1
Otorhinolaryngology	8	12.5
Thoracic Surgery	4	6.3
Orthognathic (Jaw) Surgery	4	6.3
Plastic Surgery	2	3.1

Results

A total of 67 patients were intubated with the help of flexible fiberoptic bronchoscopy during the study period. Of these 67 patients, 12 (17.9%) patients were emergency intubation or intubation following the failure of routine laryngoscopy-guided intubation. The male gender was frequent in this study (n=42 (62.7%)). The mean age was 55.5±15.3 years ranging between 18 and 86 years. Intubations were performed frequently in the operation room (92.5%). The majority of the patients' *Mallampati* score was class IV (76.1%). Only one patient with class II is evaluated as having a difficult airway because of obesity. The most frequent 3 indications for ETT with the help of a bronchoscope were limitation of the mouth opening (40.3%), obesity (20.9%), and vertebrate-cervical fracture (11.9%), in diminishing order. The order of surgical branches and other rare

Table 2. Information about performed tracheal intubations of the patients

	n	%
Intubation route		
Orotracheal intubation	53	79.1
Nasotracheal intubation	14	20.9
Emergency situation		
Yes	9	13.4
No	58	86.6
Size of ETT		
7	14	20.9
7.5	49	73.1
8	4	6
Type of ETT		
Standard ETT	55	82.1
Silicone reinforced spiral ETT	12	17.9
Duration of procedure, minute	3.4±1.9	
Complications		
Desaturation	8	11.9
Epistaxis	2	3

ETT: Endotracheal intubation tube

Figure 2. Different types of indications of the difficult airway **(A-E)**

indications were listed in Table 1.

The most preferred intubation route was orotracheal intubation (n=53, 79.1%). Nasotracheal intubation was preferred in 14 cases (20.9%) according to the operation type (Table 2). Emergency intubation was present in 9 cases (13.4%), the rest of them was elective cases. The most frequently used ETT size was 7.5 mm (n=49 (73.1%)) and the most frequently used ETT was standard ETT. Silicone-reinforced ETT was preferred especially for nasal intubations to decrease complications for nose bleeding. The mean duration for ETT via bronchoscopy guidance was 3.38 minutes (ranging between 1-8 minutes). The most frequently seen complication was transient oxygen desaturation below 90% in 8 patients (11.9%). All oxygen desaturations were reversible after initiating mechanical ventilation. Self-limiting epistaxis was reported in only 2 cases (3.0% of all cases and 14.3% of nasotracheal intubations). No other severe complications were reported during our study (Table 2). After all intubation procedures, patients were successfully ventilated.

Discussion

A "difficult airway" is the most important and prevalent condition that may be predicted or not during preoperative anesthesia consultation, especially with the examination of the patients. Sometimes it may not be possible to predict until examination with the laryngoscope. Unsuccessful endotracheal intubation may have resulted in more severe outcomes including respiratory failure, airway edema, bleeding or perforation, neurological sequelae, and death of the patients. So, it is very crucial to intubate a patient with a rapid attempt with the help of a bronchoscope. In the present study, we retrospectively analyzed the data of 67 patients who were successfully intubated with the guidance of the flexible fiberoptic bronchoscope. More than 75% of them were classified as the highest *Mallampati* classification. The most frequent indications

Figure 3. Right-sided mandibular swelling that prevents the opening of the mouth **(A),** Coronal section of the Computed Tomography (CT) scan reveals a right-sided, 6x3 cm in diameter mandibular lesion with necrosis that extends from the inferior corpus to the superior ramus **(B),** Successful nasotracheal intubation with the help of flexible fiberoptic bronchoscope **(C)**, Decreased opening of the mouth due to mandibular fracture **(D),** CT scan revealed complete mandibular fracture along with the right mandibular angle **(E),** Nasal route intubation was preferred for the operation **(F).**

for the bronchoscopy-guided ETT insertion were mouth-opening limitation, obesity, and fracture of cervical vertebrates (Figure 2). A great majority of the intubation route was orotracheal intubation. Only about 20% of the patients were intubated by the nasotracheal route (Figure 3). The most frequently reported complication was desaturation in 11.9% of the cases and epistaxis was the other complication in 3% of all patients during nasotracheal intubation. There was no failure to intubate during bronchoscopy guidance.

During this study period, in the hospital records, 12 patients who were intubated during elective intubation with higher preoperative Mallampati grade (III or IV class) were intubated with conventional laryngoscopy guidance. A bronchoscopist was ready to help with intubation procedures during these laryngoscopy-guided intubation attempts.

In the literature, there are many studies suggesting awake intubation with the guidance of fiberoptic bronchoscopy as the golden standard [6-9]. Induction anesthesia is supposed to promote respiratory insufficiency in case of failure of mask ventilation. Peterson et al. reported that during difficult airway intubation the risk of mortality and morbidity (including brain damage, airway injury, aspiration pneumonitis, etc.) was higher, especially in emergencies and induction of anesthesia [10]. Fortunately, although we performed all intubation procedures under the induction of general anesthesia, we did not encounter any of these severe incidents. Similarly, Ajay et al. also reported that fiberoptic bronchoscopy-aided intubation is a safe procedure under the induction of general anesthesia [3]. During this study, we encountered 2 cases of epistaxis during nasal intubation. These cases were intubated with standard ETTs. After these 2 cases, we started to use silicone-reinforced spiral ETT to encounter this complication. In this study, we calculated the mean duration of bronchoscopy-assisted ETT as 3.4±1.9 minutes ranging between 1 to 8 minutes. To our knowledge, this information is the first presented data in English literature.

The main limitation of this study was its retrospective design. We do not know the exact information about the patients intubated traditionally with higher Mallampati scores during the study period. The second limitation is the absence of other data to put forward an algorithm for anticipated difficult airway, e.g. body mass index, neck circumference, sternomental distance, thyromental distance, comorbid disease including sleep apnea, and previous intubation history. The third is the small sample size to evaluate the efficacy of bronchoscopy-guided intubation procedures within the older and younger age groups. The last limitation is the absence of a control group with other intubation methods (for example intubation via videolaryngoscope guidance).

Conclusion

In conclusion, flexible fiberoptic bronchoscopy-guided endotracheal intubation is a successful and safe method during a "difficult airway". It can be also performed under general anesthesia without any severe complications if it is applied by a professional bronchoscopist.

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Conflict of Interest

The all authors declare that they have no conflict of interest.

Data Availability Statement

All data set is available if required.

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ORIGINAL ARTICLE

Evaluation of surgical antibiotic prophylaxis

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Abstract

Surgical prophylaxis is one of the areas where antibiotics are used commonly. In this study it is aimed surgical prophylaxis appropriateness and determination of cost analysis in our hospital. The study was performed November 30-15, 2018. 108 patients who underwent surgery in general surgery, orthopedics and neurosurgery clinics have been included in this prospective study. Patient selection was based on the classification of clean and clean-contaminated. Demographics, features of the surgery, applied prophylactic antibiotics and surgical prophylaxis appropriateness were recorded in the forms. All patient information forms were evaluated by infectious disease specialists using the surgical prophylaxis guide. The costs of unnecessary antibiotics were determined. Mean age of 108 patients who underwent a surgical procedure was 52.4 years and 39.8% of the patients were male and 60.2% were female. Of the surgery procedures 75.9% (n:82) were clean and 24.1% (n:26) clean-contaminated. Preoperative 58.3% (63) unnecessary antibiotic prophylaxis was detected. Continuing prophylaxis at a prolonged time were used in 99 (91.7%) patients in the postoperative period. Cefazolin is the most commonly used agent for surgical prophylaxis. The cost of unnecessary and long-term antibiotic use was determined as ₺6983,69. In this study, the time of antibiotic prophylaxis were to be a big problem. Prophylaxis often starts very early and continues for days. The wrong practices in surgical prophylaxis lead to unnecessary antibiotics treatment to the patients and also burden to the budget of the country.

Keywords: Prophylactic antibiotics, surgical prophylaxis, cefazolin

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Introduction

Surgical antibiotic prophylaxis (SAP) is the administration of short-term antibiotics to patients without pre-operative infection in order to prevent bacterial contamination that may occur during the operation. Surgical prophylaxis is an important practice for the possible infections are prevented, morbidity, mortality, and antibiotic use are reduced, and the length of stay of patients is shortened [1]. Surgical interventions, according to the risk of infection and degree of contamination; it is classified into four groups as clean, clean contaminated, contaminated and dirty wounds. While prophylactic antibiotic use is recommended for clean and clean-contaminated wounds, treatment is recommended for contaminated and dirty wounds [2].

There is SAP guidelines created by many hospitals in our country [3]. Although there are surgical antibiotic prophylaxis guidelines in hospitals, wrong practices are frequently encountered in practice. For this reason, the effectiveness of the practices should be monitored and improvement studies should be made [4]. The aim of this study is to evaluate the SAP applications in our hospital and to prevent unnecessary costs by determining the cost analysis.

Materials and Methods

Approval for the study was obtained from the Clinical Research Ethics Committee of Afyonkarahisar Health Sciences University, Türkiye (2019/12). This study was performed November 30-15, 2018. This prospective descriptive study included 108 patients operated in general surgery, orthopedics, and neurosurgery clinics with clean and clean-contaminated wound classification. A form was prepared in which the data of the patients age, gender, surgery operations, foreign bodies, prophylactic antibiotics, and time of administration, dose, and duration of use were evaluated. The forms were filled out prospectively using the surgical forms used in the operating room, patient-nurse follow-up forms, and the electronic file system. The forms of all patients were evaluated by the infectious diseases specialist using the surgical prophylaxis guide.

The patients were evaluated in three preoperative, intraoperative and postoperative periods. They were evaluated in terms of infectious causes with clinical and laboratory findings and if possible, by taking the clinical opinion of the surgeon about the patient. Preoperative unnecessary antibiotic prophylaxis, intraoperative wrong choice of antibiotic and no prophylaxis were defined as inappropriate SAP. Preoperatively unnecessarily started antibiotics and given for a long time postoperatively were determined and their costs were calculated. The data were saved to the SPSS 20 package program Windows analysis program. Percentage distribution was used for statistical evaluation.

Results

In this study, 108 patients were included and, 39.8% (n:43) were male and 60.2% (n:65) were female. The mean age of the patients followed was 52.14 ± 17.25. The surgical operations of 75.9% (n:82) were clean and 24.1% (n:26) were clean-contaminated operations. The distribution of the patients according to the clinics where they were operated is shown in Table 1.

Table 1. The patients according to the clinics where they were operated

Clinics	Number of patients (n)	Percentage (%)
General surgery	48	44.4
Neurosurgery	22	20.4
Orthopedics	38	35.2

Table 2. Unnecessary used antibiotics preoperatively

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	32	29.6
Ceftriaxone	7	6.5
SAM	22	20.4
Ciprofloxacin	2	1.9

Unnecessary antibiotic prophylaxis was started in 63 (58.3%) patients in the preoperative period. This situation was found inappropriate according to our surgical prophylaxis guideline. Cefazolin (46.3%) and ampicillin-sulbactam (20.4%) were the most commonly unnecessary used antibiotics preoperatively (Table 2).

In the intraoperative period was determined that 66.7% (n:72) of the antibiotics given were appropriate and 33.3% (n:36) were inappropriate. It was determined that cefazolin 20.4% (n:50) was used the most for intraoperative surgical antibiotic prophylaxis in accordance with the guideline (Table 3).

Long-term antibiotics were used in 99 (91.7%) patients in the postoperative period, and this was defined as prolonged prophylaxis. The most commonly used antibiotics for prolonged postoperative prophylaxis were cefazolin (35.2%), ampicillin-sulbactam (35.2%) and ceftriaxone (17.6%). (Table 4).

The duration of postoperative prophylaxis 24 hours in 33 (30.6%) patients, 48 hours in 21 (19.4%) patients, 72 hours in 20 (18.5%) patients, 96 hours in 8 (7.4%) patients, 5 days in 8 (7.4%) patients, 6 days in 6 (1.9%) patients, 7 days in 4 (2.8%) patients, and 14 days in 3 (2.7%) patients was determined.

The total amount of antibiotics given wrong according to the guideline between the dates of the study was determined as ₺6983.69 (Table 5).

Discussion

Inappropriate antibiotics use is an important problem in Türkiye as well as all over the world. In studies performed in Türkiye, SAP applications are reported as the most common cause of inappropriate antibiotic use, and it is reported that problems such as increasing antibiotic resistance, side effects and cost [5-8]. In surgical prophylaxis, antibiotics that are sufficient for the surgical site, the narrowest-spectrum, have no side effects, have the lowest cost and resistance and should be selected. The use of broad-spectrum antibiotics in prophylaxis causes the development of resistance in microorganisms [9]. Cefazolin is suitable antibiotic for surgical prophylaxis and does not cause the development of resistance [10]. In this study, cefazolin was used, and it is possible to say that there is no problem in choosing antibiotics. The timing of surgical prophylaxis is more important. It should be 30-60 minutes before

Table 3. Intraoperative used antibiotics

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	50	46.3
Ceftriaxone	4	3.2
SAM	4	2.8
Ciprofloxacin	3	3.7

Table 4. Postoperative used antibiotics

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	38	35.2
Ceftriaxone	19	17.6
SAM	38	35.2
Ciprofloxacin	4	3.7

Table 5. Cost analysis and inappropriate used antibiotics

Antibiotics	Number of antibiotics (n)	Cost analysis (₺)
Cefazolin	267	1981.14
Ceftriaxone	81	1095.93
SAM	656	3562.08
Ciprofloxacin	23	344.54
Total	1027	6983.69

surgery or during the induction of anesthesia for the effective concentrations in serum and tissues [10]. Surgical antibiotic prophylaxis in 3 hours or more before the operation has been shown to be ineffective in preventing surgical site infections [11,12]. In current study, it was found that surgical prophylaxis was started in the early preoperative period in 63 (58.3%) patients. Long-term prophylaxis is a common wrong practices. Although a single dose of antibiotic is usually sufficient in surgical prophylaxis, the dose can be repeated in cases where the operation lasts longer than 4 hours and there is excessive blood loss. It is recommended that surgical prophylaxis should not exceed 24 hours in the presence of surgical drains and catheters [10]. Continuation of antibiotics after surgery does not cause a significant reduction in surgical site infections [12-14]. In many studies in Türkiye, it has been shown that prophylaxis is prolonged unnecessarily [7,8,15,16]. A recent multicenter study reported prolonged prophylaxis in half of the surgical procedures [17]. In this study, it was determined that long-term antibiotics were used in 99 (91.7%) patients, and prolonged prophylaxis was found to be an important problem in our hospital. Inappropriate antibiotic use in surgical prophylaxis cause unnecessary antibiotic administration to the patient and increase the cost of treatment. In the literature, there are studies in which cost calculations are made in SAP applications [6,8,18]. In our study, the total additional cost of inappropriate use of antibiotics was found to be ₺6983.69. Surgical prophylaxis is generally responsibility of the surgical team in our country [19]. Most of the studies have reported the physicians to use unnecessary antibiotics in surgical clinics. The main reasons of inappropriate surgical prophylaxis are inadequate knowledge, concern, and lack of local surgical prophylaxis guidelines in hospitals [17,20,21].

Conclusion

In conclusion, it is found that the prophylaxis duration continues to be a problem more than the decision of choice of antibiotic and was not consistent with the guideline. Prophylaxis was often started very early or late and continued for days in this study. In addition, although there is a guide on surgical antibiotic prophylaxis in our hospital, it has been observed that in practice, surgeons make different applications about SAP. For this reason, interactive educations should be provided by the infection control committee for surgical departments in order to eliminate errors in SAP applications. Surveillance programs for surgical prophylaxis should be performed, and a multidisciplinary SAP team should be established with the surgeons.

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Conflict of Interest

The author states no conflict of interest.

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ORIGINAL ARTICLE

Psychological resilience and stress coping methods in patients presenting with conversive symptoms and general medical symptoms

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Abstract

To investigate the differences between the levels of psychological resilience and coping with stress among individuals presenting with conversion symptoms and general medical symptoms to the emergency department. A comparative-descriptive research study was conducted on 118 patients (n = 59) who presented with conversion symptoms (n = 59) and general medical symptoms (n = 59) from the Kafkas University Health, Practice and Research Hospital, Emergency Department. The research data were collected using a general information form, the Stress Coping Styles Scale (SCSS) and the Brief Resilience Scale (BRS). In addition to descriptive statistical methods, chi-square analysis and t-test were used in the evaluation of differences between groups. The mean age of the participants in the conversion symptoms group was 28.10 ± 13.49 and 25.69 ± 7.85 in the control group. The mean score obtained by the participants in the control group on the BRS was found to be significantly higher than that of the participants in the conversion symptoms group (p <0.05). There was no significant difference between the groups in terms of the mean scores on the subscales of the SCSS (p > .05). Psychological resilience levels were low in patients presenting with conversion symptoms. Based on this finding, individuals presenting to health centers with conversion symptoms would greatly benefit from the development of therapeutic interventions that aim to improve psychological resilience.

Keywords: Conversion, psychological resilience, coping skills

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Introduction

Conversion disorder, which used to be called hysteria, was considered a uterus-based disorder in the 16th century [1]. Today, the disorder is also referred to as functional neurological symptom disorder and is characterized by function loss associated with one or more pseudoneurological symptoms [2]. There is no actual neurological disorder, but neurological symptoms do exist [3]. These symptoms affect the voluntary motor and sensory system [4]. According to the DSM-5, the prevalence of conversion disorder is between 2 to 5 / 100.000 [5].

Although the main etiologic mechanism of conversion disorder is assumed to be psychological, this traditional model (e.g. Freudian) is opposed because stressors are not clearly visible in all patient. [6]. Modern models correlate symptoms, cognitions and behavioral factors with neuronal connections [7], but there are few experimental results supporting these models or providing neuroanatomical specificity. The literature shows that experiencing traumatic events in either childhood or adulthood is correlated to psychopathology development in the further stages of life [8]. Childhood trauma is the most evidently shown factor [9-10]. Besides these, physical symptoms are a more commonly accepted way of showing the existence of pain. Therefore, when an individual with conversion disorder faces a stressful situation, they can use physical symptoms as a way to express difficulties they are experiencing [4].

Throughout the course of a lifetime, individuals may encounter numerous adverse situations or traumatic, shocking and stressful life events. Each individual who experiences these negative situations has different reactions to them or ways to cope with them [11]. Folkman and Lazarus defined coping with stress as the cognitive and behavioral efforts individuals develop when they face stressful situations and that they use to overcome the demands of the environment. Moreover, they analyzed stress coping methods under two groups, namely, "Emotional-Focused Coping" and "Problem-Focused Coping." "Problem-Focused Coping" reduces stress by solving problems, whereas "Emotional-Focused Coping" produces emotional distress associated with certain situations; in other words, in the case of the latter, instead of handling a problem, the problem is denied or avoided and the negative emotions created by the problem are shared. Avoidance coping strategies are examples of emotional coping. Problem-focused coping strategies are a form of active coping and planning and include spiritual coping methods. [12]. According to the results of studies conducted with patients with conversion disorders, these patients were less able to cope with stress [13-15], and in terms of the coping strategies they did apply, active and problem-focused coping strategies were used less often than emotional-focused and avoidance strategies [16-20]. Psychological resilience is considered as a personal characteristic that eases struggling against difficult living conditions, and it is defined as individuals' ability to recover, rehabilitate, return to their old functionality and readjust. Therefore, psychological resilience can also be a protective factor [21].

The relationship between psychological resilience, conversion disorder and coping with stress has been discussed in various studies [16,17, 23, 24]. In line with the aforementioned studies, the aim of this study was to investigate the differences between the levels of psychological resilience and stress coping methods in individuals presenting with conversion symptoms and other symptoms to the emergency department. Accordingly, this study applied a comparative-descriptive design. The following hypotheses were developed for this study:

1. The psychological resilience of the patients with general medical symptoms is higher than that of those presenting with conversion symptoms,

2. Patients with general medical symptoms use active coping methods more than those presenting with conversion symptoms,

3. Patients with conversion symptoms use avoidance coping methods more than those presenting with general medical symptoms.

Materials and Methods

Ethical Considerations

Ethical approval (2018/46) and institutional permission (2018/35380) were obtained from the Kafkas University Ethics Committee. All participants were informed about the study process and their written informed consents were obtained.

Sample

In this study, the sample size was calculated based on a 95% confidence interval using the G* Power version 3.1.9.4 program. In a previous study [17] the effect size obtained was 1.80 and the minimum sample size was calculated to be 20 people with 0.95 theoretical power. During the study period, 85 conversion patients were treated in the emergency department. The sample of this study involved 118 people, a case group, which included 59 patients who presented to the emergency department of Kafkas University Health, Practice and Research Hospital between March 2018 to 2019 with conversion symptoms after other organic causes foreseen in differential diagnosis were excluded, and who were treated according to conversion pre-diagnosis, and a control group, which included 59 patients who presented to the emergency department of the same hospital with mild physical symptoms (fever, cough, sore throat, headache, indigestion, mild pain, diarrhea /constipation etc.) and received treatment.

Inclusion Criteria

Inclusion criteria were to be showed conversion symptoms after exclusion of other organic causes in the differential diagnosis, to agree to participate in the study, to be 18 years of age or older. Inclusion criteria for the control group were general medical conditions, having mild physical illness such as fever, cough, sore throat, headache, indigestion, minor pain and oozing, diarrhea/constipation, and infectious diseases.

Exclusion Criteria

Exclusion criteria of the study, presence of any organic reason for the patient's complaint, having a diagnosed psychiatric illness, the patient's refusal to participate in the study and not giving consent or wanting to leave the study afterwards, the study questionnaires were not fully completed, the patient had serious health problems such as cancer, HIV/AIDS and substance use-related disorders.

Instruments

General information form

This form was developed by the researchers and includes 18 questions under three sections. The first section features questions related to the participants' sociodemographic characteristics such as age, gender, education level, marital status, occupation, place of residence, level of income, and family type. The second section includes questions about the participants' mental health characteristics such as psychiatric diagnosis and treatment history, psychiatric diagnosis and treatment history of the family, smoking, alcohol, substance use history, and suicide attempt history. Finally, the third section has questions related to the participants' subjection to violence, such as physical, emotional and sexual violence history in the family.

The stress coping styles scale (SCSS)

This scale was developed by Lazarus and Folkman in 1980 to determine individuals' subjective stress coping styles under stressful situations. In Türkiye, the first standardization was carried out in 1995 by Şahin and Durak who reduced the scale to 30 items under five subscales for its adaption to university students. The subscales of the adapted scale are "Self-Confident Approach", "Desperate Approach", "Submissive Approach", "Optimistic Approach" and "Social Support Seeking Approach" [25]. The items on the scale are scored as 0%, 30%, 70%, and 100% in terms of their applicability to individuals. The first and 9th items are reversely scored. No total score is obtained from the scale. The scores are separately calculated for each subscale. Higher subscale scores indicate that the approach specified in the subscale is used more in coping with stress [25]. *Cronbach's alpha* values of the subscales as obtained in the validity and reliability study of the scale were as follows: between .68 and .49 for "Optimistic Approach", between .80 and .62 for "Self-confident Approach", between .73 and .68 for "Desperate

Approach", between .70 and .47 for "Submissive Approach", and between .47 and .45 for "Social Support Seeking Approach" [25].

The brief resilience scale (BRS)

This scale was developed by Smith et al. in 2008. The BRS is a 5-point Likert type, 6-item, self-report style measurement tool. Turkish validity and reliability study of the scale was conducted in 2015 by Doğan [11]. From the exploratory and confirmatory factor analysis, it was found that the scale had a one-factor model. The response options on the BRS's 5-point Likert-type scale are "Strongly disagree" (1), "Disagree" (2), "Neutral" (3), "Agree" (4), and "Strongly Agree" (5). The 2nd, 4th, and 6th items of the scale are reversely scored. High scores obtained after rescoring reversed coded items indicate high resilience level. The internal consistency coefficient of the BRS was found to be .83 [11]. *Cronbach's alpha* value in the present study was .65.

Statistical Analysis

The data were analyzed using SPSS (Statistical Package for the Social Sciences) 20.0. Descriptive statistical methods (mean, number, percentage) were used to observe the distribution of variables. Student's *t-test* was applied for independent samples and independent sample chi square test were used for the comparison of sociodemographic characteristics and scales. A $p<0.05$ value was accepted as statistically significant, and effect size was calculated using *Cohen's d* coefficient.

Results

The mean age was 28.10 ± 13.49 in the case group and 25.69 ± 7.85 in the control group. A majority of the participants from both groups were female and single, were in the process of attending university or higher education, lived in an urban setting, had an income level equal to their expenses, had a nuclear family and did not work. Moreover, it was determined that in both groups, the majority of the participants' families did not have a member with a psychiatric diagnosis, nor had the majority attempted suicide, smoked, used alcohol or substances, or been subject to emotional/physical or sexual violence (Table 1).

There was a statistically significant difference between the groups in terms of gender and education variables ($p<0.05$) (Table 1). In the patient with conversion symptoms, there was a statistically significant greater number of females than males and a statistically significant greater number of those who were illiterate or unschooled literate than those with other levels of education.

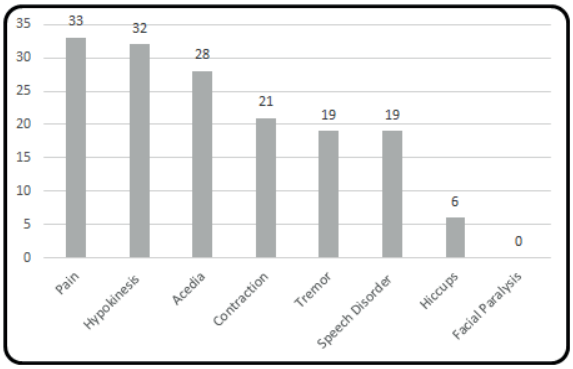

Figure 1. Descriptive Analyses of the Conversion Symptoms (n=59).

Figure 1., shows the conversion symptoms of participants in the group presenting with conversion symptoms. The most common symptoms were pain (55.9%; n=33), hypokinesis (54.2%; n=32) and acedia (47.5%; n=28). The least common symptoms were facial paralysis (0%; n=0), hiccups (10.2%; n=6), speech disorder (32.2%; n=19) and shivering (32.2%; n=19).

The mean score on the BRS was significantly higher in the control group than conversion symptom group ($p<0.05$). There was no significant difference between groups in terms of mean subscales of the SCSS scores ($p>0.05$) (Table 2).

Discussion

This study aimed to investigate the psychological resilience levels and differences in the stress coping methods between patients presenting to the emergency department with conversion symptoms and patients presenting to the emergency department with general medical symptoms.

Conversion disorder, which is classified among the somatoform disorders, is a psychiatric condition in which psychological conflicts are reflected in the form of physical symptoms

[26-28]. In line with the literature, this study also found that pain, hypokinesis, weakness, contraction, speech disorder and shivering were commonly reported.

According to hypothesis 1; we predicted that general medical patients have a higher level of psychological resilience than that of patients with conversion symptoms. According to the results, patients with general medical symptoms had higher level psychological resilience levels when compared to those of patients with conversion symptoms. Jalilianhasanpour et al. reported in their study that the resilience levels of patients with conversion disorders were lower, a finding supported by Alpat's study [17,22]. Moreover, it has been shown that there is a negative relationship between neurotic character types and resilience and a positive relationship between extroversion and awareness and

Table 1. Descriptive Analyses of the Demographic Variables (N=118)

	Conversion Symptoms	Control	Total	X^2/t	*p*
Gender (n=116)					
Female	46 (79.3%)	36 (62.1%)	84 (70.7%)	4.161	**0.041**
Male	12 (20.7%)	22 (37.9%)	34 (29.3%)		
Age	28.10 ± 13.49	25.69 ± 7.85	26.90 ± 11.07	1.111	0.27
Education Level					
Unschooled literates and illiterates	9 (90%)	1 (10%)	10 (8.5%)		
Primary and Secondary education	13 (52%)	12 (48%)	25 (21.2%)	7.416	**0.025**
University and higher	37 (44.6%)	46 (55.4%)	83 (70.3%)		
Marital Status					
Single	39 (47%)	44 (53%)	83 (70.3%)	1.015	0.314
Married	20 (57.1%)	15 (42.9%)	35 (29.7%)		
Place of Residence					
City	38 (47.5%)	42 (52.5%)	80 (67.8%)		
District	10 (62.5%)	6 (37.5%)	16 (13.6%)	1.200	0.549
Village	11 (50%)	11 (50%)	22 (18.6%)		
Income (n=115)					
Income is less than expenses	14 (41.2%)	20 (58.8%)	34 (29.6%)		
Income is equal to expenses	31 (51.7%)	29 (48.3%)	60 (52.2%)	1.096	0.578
Income is greater than expenses	11 (52.4%)	10 (47.6%)	21 (18.3%)		
Family Type (n=117)					
Nuclear family	43 (50%)	43(50%)	86 (73.5%)	0.024	0.878
Extended family	15 (48.4%)	16 (51.6%)	31 (26.5%)		
Employment Status(n=117)					
Employed	41 (50%)	41 (50%)	82 (70.1%)	0.020	0.887
Unemployed	17 (48.6%)	18 (51.4%)	35 (29.9%)		
History of Psychiatric Diagnosis in Family					
No	54 (47.8%)	59 (52.2%)	113 (95.8%)	5.221	0.057
Yes	5 (100%)	0 (0%)	5 (4.2%)		
Smoking					
No	48 (55.8%)	38 (44.2%)	86 (72.9%)	3.473	0.062
Yes	11 (34.4%)	21 (65.6%)	32 (27.1%)		
Alcohol/Substance Use					
No	55 (51.9%)	51 (48.1%)	106 (89.8%)	0.835	0.361
Yes	4 (33.3%)	8 (66.7%)	12 (10.2%)		
Suicide Attempt					
No	56 (49.6%)	57 (50.4%)	113 (95.8%)	0.209	0.648
Yes	3 (60%)	2 (40%)	5 (4.2%)		
Subjected to Physical Violence					
No	57 (49.6%)	58 (50.4%)	115 (97.5%)	0.342	0.559
Yes	2 (66.7%)	1 (33.3%)	3 (2.5%)		
Subjected to Emotional Violence					
No	53 (47.7%)	58 (52.3%)	111 (94.1%)	3.797	0.051
Yes	6 (85.7%)	1 (14.3%)	7 (5.9%)		
Subjected to Sexual Violence					
No	58 (49.6%)	59 (50.4%)	117 (99.2%)	1.009	0.315
Yes	1 (100%)	0 (0%)	1 (08%)		

X2:** Chi-square; **t:** Student's *t Test*; ***p < .05

resilience [23]. In one conducted by Ahmad & Bokharey, it was reported that the psychological well-being levels of the patients with a general medical condition were significantly higher than those of the patients with conversion disorder [16]. Furthermore, it has been shown a positive relationship exists between psychological resilience and mental health [29]. For example, in a study analyzing whether psychological resilience is a protective or curative factor in adverse mental states that result from experiencing major stress [30], it was shown that psychological resilience is both protective and curative. Moreover, the intermediary role of resilience in perceived stress, anxiety and depression was highlighted [3]. In another study, that assessed the correlation between suicidal ideation and psychological resilience, the psychological resilience score was reported to be significantly lower in the group with suicidal ideation [32]. The same study recommended that psychological resilience should be improved. Lee et al. stated that resilience is a dynamic process, can change through time, and can be affected by environment [33]. According to the results of the present study, patients in the conversion symptoms group may not have been in suitable individual, family, and social environments for the growth of psychological resilience in the development processes. This might have led to lower psychological resilience in the conversion symptoms group compared to that of the control group. Also; the positive emotion can effect psychological resilience, hence the nature of the conversion symptoms patient can always be in the negative mood. Thus, the resilience scores were lower than acute general medical condition. Considering the relationship between psychological resilience psychopathology [34], the lower mean psychological resilience scores of the conversion symptoms group are in agreement with the relevant literature. Resilience is a personality trait related to personal well-being, insofar as it sustains a healthy state in the face of stressful situations.

In the analysis of the relationship between mental health and psychological resilience, it was observed that psychological resilience was lower in the individuals with conversion symptoms. Moreover, studies analyzing the relationship between conversion disorder and sociodemographic variables have shown that there are higher rates of conversion disorder among those who reside in rural areas, have a low education level and low socioeconomic level, are female and young, and have a history of sexual/physical abuse [27,35]. In the present study, there was a significantly higher rate of participants who were female and unschooled literate and illiterate compared to that of the control group. In addition to the psychological resilience mean score, gender and education level variables, should also be considered as factors contributing to the etiology of conversion symptoms in this region.

The results of this study showed that there was no significant difference between the coping with stress methods used by the groups; rather, they used similar coping with stress methods. The

Table 2. Analysis of between patient with control group and conversion symptoms

Variables	Conversion Symptoms (M± SD)	Control (M± SD)	*t*	*p*	95% *CI*		*Cohens*
					LL	UL	d
BRS	17.86±4.86	20.03±3.94	-2.630	**0.010***	-3.803	0.535	**0.49**
SCA	14.03±4.76	13.50±4.38	0.623	0.535	-1.145	2.196	0.11
DA	12.22±5.68	11.52±5.44	0.678	0.499	-1.335	2.724	0.12
SA	7.64±3.61	7.22±4.05	0.599	0.550	-0.977	1.825	0.10
OP	9.05±3.65	9±3.01	0.082	0.934	-1.171	1.272	0.01
SSA	12±7.33	7.54±1.9	-0.454	0.651	-1.092	0.685	0.83

BRS: The Brief Resilience Scale, **SCA:** Self-confident Approach**, DA:** Desperate Approach**, SA:** Submissive Approach, **OP:** Optimistic Approach, **SSA:** Social Support Seeking Approach *$p < .05$, **M:** Mean, **SD:** Standard Deviation, ***CI:*** Confidence Interval.

SCSS classifies the subjective coping methods that individuals use when they encounter stressful situations as either emotion-focused (ineffective) or problem-focused (effective) [25]. The present study found that the individuals in the conversion symptoms group and the individuals with general medical symptoms use emotion-focused or problem-focused stress coping methods at similar levels when they encounter a stressful situation. Contrary to results reported in previous studies, the findings in this study showed that the groups did not differ in terms of the coping with stress methods they applied [16-20,24]. Otherwise stated, individuals with conversion symptoms tend to use avoidance and emotion-focused coping methods, compared to problem-focused coping methods, at higher rates and more actively. Myers et al. indicated in their study that three out of four patients experiencing psychogenic neuroleptic seizures used emotional-focused coping strategies, and that psychopathologic conditions, including conversion, were encountered more often in patients who used emotional-focused coping strategies at high levels [13]. These conflicting results reveal that more studies need to be carried out in this field and region to verify the results of this study and to provide more data on their causes. A study carried out by Evrin & Kaykısız reported that a majority of the individuals who presented to the emergency department and were subsequently diagnosed with conversion disorder were female and single [36]. Considering the sociodemographic characteristics of the participants (*i.e.* being female and single, having a low or intermediate level of income, being unemployed) in the present study and the general patriarchal culture defining the city in which they reside, the limited social opportunities, and the climate conditions, it is not surprising that all the participants tended to use problem-focused coping methods at a low level and emotion-focused coping methods at a high level.

Conclusion

In this study, it was determined that the psychological resilience levels of patients with conversion symptoms were low. This result is important insofar as it shall aid the development of therapeutic interventions aimed at increasing psychological resilience. The stress coping strategies used by patients with conversion symptoms and by those with a general medical condition were similar. It is recommended that future studies on this subject examine the reason(s) behind this similarity. Additionally, considering that patients with conversion disorder are challenging to diagnose and treat due to their complex presentation, symptoms common to this disorder should be taken as indicators, especially in presentations to the emergency department. A multidisciplinary approach, one that involves the clinician-patient relationship and appropriate communication, proper neurological/epilepsy evaluation, diagnosis, treatment, psychiatric treatment, psychotherapy, and when necessary, physical treatment and pharmacotherapy, is needed in the treatment of conversion symptoms, especially in emergency departments.

Limitations

This study did have some limitations. First, the sample size of the study was small. To improve statistical significance and generalizability of the results, future studies on this subject should have larger sample sizes. Another limitation of this study was that the percentage of females and those with lower education levels was higher in the conversion symptom group compared to the control group. This situation limits the ability to generalize the results to both genders and all education levels.

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Conflict of Interest

No conflict of interest was declared.

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CASE REPORT

Improvement in renal function after empirical steroid therapy in NSAID-induced acute kidney injury

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Abstract

We report a case of an 81-year-old woman, who developed acute kidney injury (AKI) during treatment of gout with naproxen. The patient's other comorbidities were chronic kidney disease grade G3b, chronic heart failure with permanent atrial fibrillation, arterial hypertension, osteoarthritis and osteoporosis. After excluding other causes of AKI, a presumptive diagnosis of NSAID-induced acute interstitial nephritis was established. Because of multiple comorbidities and anticoagulation, renal biopsy was not attempted. Since we observed no improvement after naproxen discontinuation, steroid-pulse therapy was initiated, with subsequent oral steroid follow-up. As a result, after several days we achieved improvement in renal function, with complete recovery after couple of months. In conclusion, we suggest that aggressive steroid therapy be considered for patients with presumptive diagnosis of NSAID-induced interstitial nephritis, especially when comorbidities and general state preclude invasive diagnostic measures.

Keywords: Interstitial nephritis, acute kidney injury, NSAID toxicity

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Introduction

Acute interstitial nephritis (AIN) is a common, but underdiagnosed cause of acute kidney injury (AKI), accounting for about 15-20% of all cases [1]. AIN can be hypersensitivity-related (most common), infective, secondary to connective tissue disease (CTD) or idiopathic [2-4]. The majority of AIN cases are drug-induced, of which non-steroidal anti-inflammatory drugs (NSAIDs) and antibiotics are the main culprits [1,5,6]. Patients with AIN may present with oliguria, maculopapular rash, hematuria, fever, arthralgia, peripheral edema, hypertension and costovertebral angle tenderness; laboratory studies often reveal proteinuria, erythrocyturia, eosinophilia, and abnormal renal function tests (RFTs). There is no single specific test for AIN and definitive diagnosis can only be made by renal biopsy [1,6,7]. As a result of unspecific nature of symptoms, ambiguous laboratory studies and lack of simple, safe, specific and available diagnostic measures, AIN can be easily overlooked as a cause of AKI [1]. Treatment modalities are mainly supportive in nature, with discontinuation of an offending drug as the most important measure; if renal dysfunction persists, initiation of steroids can be considered, [1,6,7] even though there is limited evidence on the effect of such a therapy [9]. Moreover, it is often stated that before initiating steroid therapy, renal biopsy should be obtained, despite its invasive nature and unfavorable risk profile (especially for patients with multiple comorbidities) [1,6,10]. AIN is usually expected to resolve and complete recovery of renal function is often observed, although some cases lead to progressive renal loss with subsequent end-stage renal failure [6,7].

Case presentation

An 81-year-old female presented to ED with weakness, edema and nycturia of five days' duration, which appeared six days after treatment with naproxen sodium (550 mg twice daily) for gouty arthritis of right first metatarsophalangeal joint. The patient's other medical history was notable for chronic kidney disease G3b (serum creatinine 1.4 mg/dl, eGFR 37.2 ml/min - on a stable level for the last 8 years; the earlier course of renal function was unknown due to lack of medical record from that time), chronic heart failure with preserved ejection fraction (HFpEF) with permanent atrial fibrillation, arterial hypertension, osteoporosis, osteoarthritis, mild obesity and breast cancer (successfully treated with mastectomy and radiotherapy 30 years ago). Except naproxen, her medication included: acenocoumarol 0.5 mg qd, torasemide 5 mg qd, metoprolol succinate 25 mg qd and lercanidipine 10 mg qd.

Upon admission the patient was afebrile, alert, fully oriented, without signs of distress. Her vital signs were normal (BP 130/90 mmHg, HR 80/min, SaO2 98%, normal capillary-refill time), physical examination was remarkable only for bilateral moderate lower leg pitting edema. Auscultation revealed normal breath sounds and normal heart sounds, there were no signs of arthritis, costovertebral angle tenderness was absent and except post-mastectomy right-sided scar, no rash was noticed.

Investigations

The patient's basic laboratory tests were significant for high RFTs (serum creatinine concentration – 3.0 mg/dl, urea concentration 176.8 mg/dl), moderate hyperkalemia (6.1 mmol/l), elevated ESR (65 mm/h) with near-normal CRP concentration (8.46 mg/l) and hyperuricemia (7.6 mg/dl). LFTs, other electrolyte concentrations (including sodium, calcium, chloride, bicarbonate and inorganic phosphorus), ABG and glucose were within normal limits. Blood morphology showed mild eosinophilia (0.52 G/l) and coagulation studies showed subtherapeutic INR of 1.41. ECG was performed, which revealed atrial fibrillation with ventricular response of 80/min, without signs of ischemia and without signs specific for hyperkalemia, including normal T waves. Requested urinalysis demonstrated moderate proteinuria (129.0 mg/dl), mild leukocyturia (10-20/hpf) and moderate erythrocyturia (60-100/hpf), with dysmorphic erythrocytes predominant. The laboratory work-up is presented in Table 1 and Table 2.

To precisely assess the urine output, Foley catheter was temporarily inserted. This revealed oliguria of 30 ml/h (0.32 ml/kg/h). Abdominal ultrasound was performed, which showed normal-sized kidneys with reduced corticomedullary differentiation without urine stasis, with few renal cysts. No other pathologies were noticed.

Differential Diagnosis

The clinical picture was consistent with diagnosis of acute kidney injury (AKI). Serum creatinine was 2.1 times baseline and moderate oliguria was present, which fulfilled 2012 KDIGO criteria of stage 2 acute kidney injury [11]. In order to find the cause of AKI, a list of possible (for this particular patient) differential diagnoses was made. This included prerenal causes of decompensated heart failure and intrinsic causes of urinary tract infection (UTI), acute glomerulonephritis and drug-induced interstitial nephritis. Postrenal causes of AKI were ruled out due to lack of urine stasis under ultrasound examination. The patient did not complain about worsening dyspnea. Besides, her ABG was normal, and no rales were noticed during physical examination. This made heart failure decompensation as a cause of AKI unlikely. Similarly, no signs of UTI (*e.g.*, dysuria, frequent urination, fever) were present. However, to exclude infection in face of leukocyturia and elevated inflammation parameters, urine cultures were obtained, which proved negative.

Acute glomerulonephritis and acute interstitial nephritis are other possible causes of AKI in this patient. To differentiate between them, 24h urine was collected, and daily proteinuria was assessed, which turned out to be 0.51 g/d. Such a mild proteinuria, together with blood eosinophilia and naproxen use (which can provoke allergic nephritis), support acute tubulointerstitial nephritis as a plausible cause of AKI in our patient. On the contrary, normal blood pressure, lack of severe proteinuria and no obvious, identifiable cause decreased the likelihood of acute glomerulonephritis. In order to make an unequivocal diagnosis, renal biopsy was considered. However, due to anticoagulation therapy, renal cysts, chronic heart failure, and chronic kidney disease, renal biopsy would have been associated with high risk

Table 1. Results of laboratory work-up – peripheral blood

Test	Result	Test	Result
WBC	10.52 G/l	**Serum Creatinine**	3.0 mg/dl
Hb Concentration	12.3 g/dl	**Serum Urea**	176.8 mg/dl
PMNs	6.13 G/l	**Serum Potassium**	6.1 mmol/l
Eosinophiles	0.52 G/l	**Serum Sodium**	137 mmol/l
Basophiles	0,11 G/l	**Serum Chloride**	102 mmol/l
Lymphocytes	3.23 G/l	**Serum Phosphorus**	3.7 mg/dl
Monocytes	0,53 G/l	**Serum Calcium**	8.6 mg/dl
CRP	8.46 mg/l	**Arterial pH**	7.36
ESR	65 mm/h	**Arterial Bicarbonate**	22 mmol/l
ALT	32 U/l	**Arterial pO_2**	91 mmHg
AST	27 U/l	**Arterial pCO_2**	39 mmHg
Serum Bilirubine	1.1 mg/dl	**Serum Uric Acid**	7.6 mg/dl
INR	1.41	**Serum Glucose**	95 mg/dl
Serum Albumin	3.7 g/dl	**Serum Protein**	6.4 g/dl

Table 2. Results of laboratory work-up - urinalysis (includes daily proteinuria)

Test	Result
pH	7.5
Specific Gravity	1.015 g/ml
Protein Concentration	129.9 mg/dl
Proteinuria	0.51 g/d
Glucose	Absent
Leukocytes	10-20 /hpf
Erythrocytes	60-100 /hpf

of potentially serious complications, including hemorrhage and renal failure exacerbation. Therefore, no renal biopsy was performed and presumptive diagnosis of NSAID-induced acute tubulointerstitial nephritis was established.

Other, less common, but theoretically possible diseases that were considered in this patient, included TINU (tubulointerstitial nephritis with uveitis), connective tissue disease-related renal failure (*e.g.*, lupus nephritis), sarcoidosis and amyloidosis. The patient did not have any symptoms regarding eye and vision (including photophobia and ocular pain), and during physical examination no signs, such as red eye or vision loss were present; therefore, the patient was not consulted with an ophthalmologist right away, but it was kept in mind that ocular problems might appear in the future. Similarly, no signs or symptoms indicating connective tissue disease (CTD) or sarcoidosis were present; isolated renal sarcoidosis is very rare (and diagnosis requires renal biopsy), while diagnosis of CTD generally requires other symptomatology than isolated renal disease. However, this is not the case with lupus nephritis, therefore, serum antinuclear antibodies test was taken, which proved negative (the ANA titer was below 1:80). As far as amyloidosis is concerned, serum protein electrophoresis with immunofixation was done and concentration of serum free light chains with kappa to lambda ratio was assessed. Both tests did not give evidence for monoclonal gammopathy, therefore, taking into consideration no chronic inflammatory condition and the clinical picture, amyloidosis was provisionally ruled out.

Treatment

Upon admission, naproxen was discontinued, and furosemide 40 mg/d intravenously was initiated in order to treat hypervolemia and hyperkalemia. Because of no signs of pulmonary edema, only moderate hyperkalemia without any corresponding ECG changes and no signs of encephalopathy, the patient was not a candidate for renal replacement therapy (*e.g.*, hemodialysis or hemofiltration) and a conservative approach was chosen. Pending urine culture and daily proteinuria results, renal function, urine output and serum electrolytes were monitored. After

Table 3. Serum creatinine [mg/dl] on each day of treatment. Naproxen was discontinued upon admission (day 0) and steroid therapy began on day 4

Day	0	2	3	4	5	6	7	8	9	10
Serum Creatinine [mg/dl]	3.0	2.4	2.4	2.4	2.5	2.9	2.7	2.2	2.1	1.7

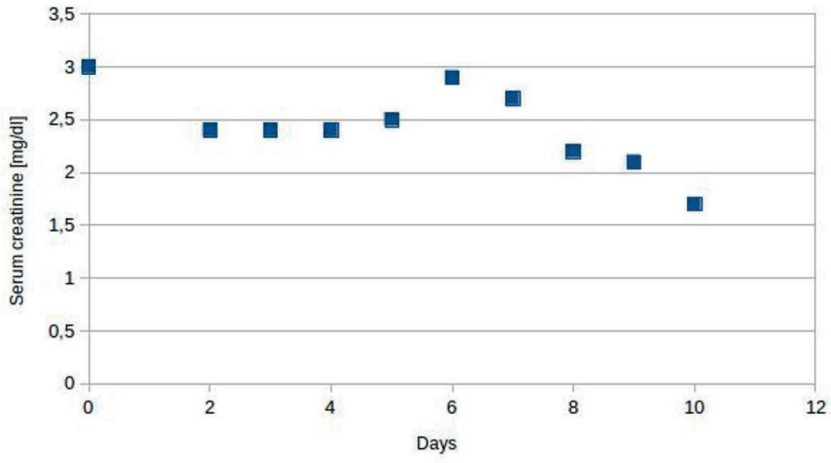

Figure 1. Serum creatinine [mg/dl] on each day of treatment presented on the graph. The baseline level of patient's renal function was 1.4 mg/dl. Naproxen was discontinued upon admission (day 0) and steroid therapy began on day 4

three days, no edema was present, oliguria was absent and serum potassium level was 4.6 mmol/l. Some improvement in renal function was noted, with serum creatinine being 2.4 mg/dl after two days and remaining stable from then on. Because of lack of further improvement, taking into consideration: 1) negative prognostic factors in this patient, including age and baseline diminished renal function, 2) benefits of early initiation of immunomodulatory therapy as opposed to delay in treatment [2], 3) risk of progression to end-stage kidney disease, after thorough discussion of pros and cons with the patient and obtaining informed consent, it was decided to initiate systemic steroid therapy on day fourth. This began with 0.5g of methylprednisolone qd intravenously for three days and was continued with prednisone 40 mg bid onwards, as in the prevailing Polish national guidelines [28]. On day fifth transient serum creatinine increase was noted (2.9 mg/dl) and then, gradual renal function improvement was observed. Serum creatinine concentrations in time are presented in Table 3 and Figure 1.

During systemic steroid therapy blood pressure, glucose levels and serum electrolyte concentrations were monitored. Glucose profile showed normal glucose levels with no signs of steroid-induced diabetes or pre-diabetes, while blood pressures were below 140/90 mmHg without any additional medication. However, serum potassium concentration decreased to 4.6 mmol/l after steroid therapy initiation, requiring oral supplementation of 20 mEq/day to be maintained at this level. Serum sodium concentrations remained within normal limits.

Apart from treatment of AKI, the patient's anticoagulation therapy needed to be revised. This was done with daily INR measurements, readjusting acenocoumarol doses accordingly. Furthermore, newly diagnosed hyperuricemia demanded appropriate management, because of its detrimental effect on patient's cardiovascular disease [12] as well as unfavorable influence on renal function [13]. Therefore, patient's diet was modified, allopurinol 100 mg qd was initiated and ambulatory serum uric acid measurement in 3 weeks recommended. Since acute kidney injury did not resolve rapidly enough, renin-angiotensin-aldosterone system (RAAS) blockade (*e.g.*, oral ACE inhibitor) was not administered. Such treatment was postponed after adequate renal function stabilization, despite its positive influence on chronic kidney disease (and patient's chronic heart failure), due to its potentially deleterious impact on AKI [14].

To prevent steroid-induced osteoporosis, calcium carbonate 500mg bid with cholecalciferol 5μg bid was started. Despite better efficacy of bisphosphonate in preventing steroid-induced osteoporosis [15], bisphosphonate potential nephrotoxicity precludes its use in the setting of AKI [16]. After renal function improvement, repeated urinalysis, blood morphology and inflammatory markers were obtained. These showed reduction of proteinuria, erythrocyturia and leukocyturia (55.2 mg/dl, 2-5/hpf and 1-2/hpf respectively), resolution of eosinophilia (to undetectable levels on automated analyzer) and restoration of CRP concentration to normal levels (5.48 mg/l; it was still too early to expect ESR decrease).

Outcome and Follow-up

On day 10th, the patient was discharged. Following medications were prescribed: prednisone 40 mg in the morning and 20 mg in the afternoon, potassium chloride 10 mEq bid, acenocoumarol 1 mg qd, metoprolol succinate 25 mg qd, lercanidipine 10 mg qd, torasemide 5 mg qd, esomeprazole 20 mg qd (gastric ulcer prevention), allopurinol 100 mg qd and calcium carbonate 500 mg bid with cholecalciferol 5 μg bid (because of relatively short time from AKI it was decided to postpone potential introduction of alfacalcidol after full assessment of Ca-P homeostasis (including iPTH and 25-OH-D3 concentration measurement) under conditions of stable recovery). The patient was advised to re-check serum creatinine, sodium and potassium levels in two weeks.

The patient appeared to her Primary Care Provider three weeks after discharge and serum creatinine, sodium and potassium were obtained. These showed serum creatinine 1.6 mg/dl, sodium 144 mmol/l and potassium 5.6 mmol/l. Improvement in renal function allowed further prednisone dose reduction, while potassium

supplementation was terminated due to mild hyperkalemia. In two months, serum creatinine was 1.4 mg/dl and steroid therapy was finished. RFTs, sodium and potassium levels remained stable after the next two months.

Discussion

Acute interstitial nephritis accounts for 15-20% of all cases of AKI and the majority of cases are caused by medication exposure [1,6,10]. Drug discontinuation is the mainstay of treatment [1,6,16-19,21] and if renal function fails to improve, systemic steroid administration should be considered [6,19-21]. However, no randomized controlled trials assessing steroids efficacy are available, [6,16,21] official evidence-based guidelines are lacking, and published studies give contradictory results, some in favor of steroid treatment [16,17] and others not supporting its use [14,20]. Similarly, as far as steroid dosing regimen is considered, generally two strategies are proposed, and there is no sound evidence that any of these is superior to the other: 1) prednisone 1 mg/kg/d for 4-6 weeks with dose tapering [17] or 2) methylprednisolone 0.5 g/d for 3 days and prednisone 1 mg/kg/d thereafter with dose tapering [28] (in the described case, second strategy was chosen because of prevailing Polish national guidelines [28] and experience). Therefore, it is generally thought that in the setting of suspected AIN not resolving after drug discontinuation, renal biopsy should be obtained [22,23]. This will document presence of AIN, exclude other causes of AKI (treated with medications other than steroids) and help to avoid side effects of unnecessarily-initiated steroid-based therapy [23]. Anyway, renal biopsy is an invasive procedure, which carry a risk of bleeding, infection and renal failure progression, complications being more common in the elderly [24,25]. Since end-stage kidney disease is related to profound worsening of life [26], a question arises what is the best approach to an older patient with likely AIN-caused AKI not satisfactorily improving after suspected drug discontinuation, provided that chronic diseases the patient suffers from, increase the risk of renal biopsy. Making a proper decision in such a scenario requires taking carefully into consideration all the known factors, pros and cons, and keeping the patient well-informed so that they could consciously agree and cooperate with the proposed or initiated treatment. In face of lacking randomized controlled trials and evidence-based guidelines, we tend to advocate for early consideration of steroid-based therapy in such situations, although we know that it cannot be clearly concluded from the case that it was the initiated steroid treatment that caused the renal function return to the baseline (for example, now it cannot be known if renal function would have improved if we had waited a bit longer after drug cessation, especially considering the reported refractoriness of NSAID-induced AIN to steroids). However, what the patient can gain is improvement of renal function (decreasing the likelihood of ESKD and related complications), even if the renal disease we treat turns out to be different than AIN, *e.g.*, acute glomerulonephritis (steroid-based therapy is frequently initiated in various acute diseases of a kidney [6]). Moreover, side effects of steroids are numerous [23], but many of them resolve after drug discontinuation; it should be reminded that in the setting of possible AIN they are used for a short time (4-8 weeks) [8,17]. At last, providing maximal comfort with minimally invasive measures, which impose the smallest possible treatment burden, is an important issue when dealing with multimorbidity of the elderly [27].

Learning Points

Acute interstitial nephritis is a common, often overlooked cause of acute kidney injury, mainly induced by allergic reaction to frequently taken drugs. When drug discontinuation does not result in renal function improvement and patient has many co-morbidities, making renal biopsy particularly risky, steroid therapy should be considered.

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Conflict of Interest

The author declare no conflict of interest.

Data Availability Statement

All presented data can be accessed.

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