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Infectious causes and outcomes of patients with high fever in the emergency department

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ABSTRACT

Aims: The aim of this study is to investigate the reasons for presentation, diagnoses, and outcomes of patients with high fever in the emergency department.

Methods: This research is a retrospective study conducted by examining the file data of patients who applied to our emergency department between 01.03.2021 and 01.03.2023 and whose body temperature was above 38°C. Patient data were obtained from patient files and Hospital Information Management System (HIMS). With the data obtained from patient files and HBYS, the demographic characteristics of the patients, vital signs at the time of admission, reasons for admission, diagnoses and outcomes were investigated.

Results: Of the 288 patients included in the study, 151 (52.4%) were male and the average age was 47.04±18.75. The reasons for applying to the emergency department were examined and it was determined that 79 (27.4%) patients complained of sore throat and 44 (15.3%) patients complained of fever. When the final diagnoses of the patients were examined, the most common diagnosis was acute tonsillitis in 99 (34.4%) patients, followed by COVID-19 in 30 (10.4%) patients. The outcomes of the patients were as follows; 190 (66%) patients were discharged from the emergency department, 63 (21.9%) patients were admitted to the ward, and 26 (9%) patients were admitted to the intensive care unit.

Conclusion: Cases with high fever in the emergency department encompass a wide range of conditions, ranging from mild viral upper respiratory tract infections to potentially fatal infections such as meningoencephalitis and myocarditis. Therefore, in febrile cases in the emergency department, serious infectious causes should be considered in terms of the focus of fever. Additionally, non-infectious causes should also be kept in mind as they can cause high fever.

Keywords: Body temperature changes, fever, fever etiology

INTRODUCTION

One of the common reasons for admission to emergency departments is high fever. Fever is an increase in body temperature above normal values controlled by the central nervous system, in response to a certain stimulus. These stimuli are active substances called pyrogens, which can be endogenous or exogenous.[1] Fever is defined as a measured body temperature above 38°C rectal, 37.8°C oral, 37,5°C tympanic, and 37.2°C in the axillary region.[2]

Fever can be a clinical finding in a wide range of different patient groups. The most common cause is infections. Infections are associated with diseases caused by bacteria, viruses, fungi, or parasites, and fever is part of the body's defense system response to these pathogens. Viral infections take the first place among the causes of infection.[3] However, the etiology of high fever may not be limited to infections only. Many different conditions, such as immunological, inflammatory states, malignancies or drug reactions, can also cause high fever.[4] For this reason, it is of great importance to comprehensively analyze and make the correct diagnosis of cases with high fever in the emergency department. Most patients who apply to the emergency department with high fever have a good prognosis and outpatient treatment is possible. However, some of the patients with high fever have important pathologies such as central nervous system infections, pneumonia, and neutropenic fever, and they need to be hospitalized and treated due to the high risk of morbidity and mortality.[4] Therefore, it is important to evaluate the differential diagnoses in patients with high fever.

This study aimed to evaluate and analyze the reasons for admission, diagnosis and outcomes of patients who applied to the emergency department of a university hospital with complaints of high fever or were detected to have high fever.

METHODS

Study Design and Participants

The study was carried out with the permission of Manisa Celal Bayar University Faculty of Medicine Clinical Researches Ethics Committee (Date: 20.03.2023, Decision No: E-85252386-050.04.04-512096). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

This retrospective study was conducted by examining the data of patients who applied to the Emergency Department of Manisa Celal Bayar University Faculty of Medicine Hospital between 01.03.2021 and 01.03.2023 and whose body temperature was above 380C in two consecutive measurements. Body temperature measurements were made using Covidien® brand temperature measurement devices that provide measurements from the tympanic membrane. Patient data were compiled through patient files and HIMS. The demographic characteristics, reasons for admission, vital signs at the time of admission, diagnoses and outcomes of the patients with complete data were determined and analyzed.

Criteria for Inclusion in the Study

- Those aged 18 and over
- Having a fever higher than 38°C
- Patients with complete data from patient files and HIMS

Exclusion Criteria from the Study

- Trauma patients
- Pregnant women
- Those under the age of 18
- Unstable patients

Statistical Analysis

The data we obtained was recorded in the SPSS 21 (Statistical Package for Social Sciences) program. First, demographic analyzes were performed. Categorical variables are shown with numbers and percentages, and continuous numerical variables are shown with center and prevalence measures such as mean, standard deviation values.

RESULTS

Demographic and Clinical Findings

288 patients who met the study criteria and whose data were fully accessible were included in the study. The average age of the patients was 47.04±18.75, 151 of them (52.4%) were male. The average vital signs of the patients are given in Table 1.

Table 1. Average age and vital signs of the patients

	Average	Standard deviation (SD)
Age	47.04	18.75
Fever (°C)	38.52	.51
Systolic blood pressure (mmHg)	125.70	20.32
Diastolic blood pressure (mmHg)	75.08	10.83
Pulse (beats/min)	101.90	18.55

We examined the reasons why patients applied to the emergency department and found that 79 patients (27.4%) complained of sore throat and 44 patients (15.3%) complained of fever. When we examined the final diagnoses, we found that the first place was acute tonsillitis (99 patients (34.4%)), while the second place was COVID-19 (30 patients (10.4%)) (Table 2). When the cases with non-infective causes were examined, dehydration was detected in 5 patients, tachyarrhythmia in 2 patients, rheumatic disease in 1 patient, hyperthyroidism in 1 patient, epileptic attack in 1 patient, and malignancy in 1 patient. The diagnosis of COVID-19 was established based on the PCR result. All diagnoses were obtained by reviewing patient records and hospital information systems. A total of 11 (3.8%) patients are defined as 'other' in Table 2.

Table 2. Reasons for admission and final diagnosis of patients

	Number (n)	Percentage (%)
Reason		
Sore throat	79	27.4
Fever	44	15.3
Chills and shivering	40	13.9
Weakness	25	8.7
Abdominal pain	22	7.6
Shortness of breath	22	7.6
Cough- sputum	16	5.6
Diarrhea	10	3.5
General condition impairment	10	3.5
Burning while urinating	9	3.1
Headache	7	2.4
Swelling and redness on the leg	4	1.4
Overall	288	100
Final diagnoses		
Acute tonsillopharyngitis	99	34.4
COVID-19	30	10.4
Pneumonia	25	8.7
Urinary system infection	21	7.3
Gastroenteritis	15	5.2
Acute Sinusitis	14	4.9
Meningoencephalitis	13	4.5
Acute otitis media	11	3.8
Other	11	3.8
Pyelonephritis	10	3.5
Cellulite	8	2.8
Appendicitis	5	1.7
COVID 19 vaccine side effect	5	1.7
Febrile neutropenia	5	1.7
Fever of unknown cause	4	1.4
Bronchitis	3	1.0
Diverticulitis	3	1.0
Perimyocarditis	3	1.0
Cholecystitis	2	0.7
Orbital cellulitis	1	0.7
Overall	288	100

We examined patient outcomes and found that 190 patients (66%) were discharged from the emergency department, 63 patients (21.9%) were admitted to the ward, and 26 patients (9%) were admitted to the intensive care unit (Table 3).

When the diagnoses of 63 patients admitted to the ward were examined, it was determined that the most common diagnosis was COVID-19 (n=11), followed by pneumonia and pyelonephritis (n=8).

Table 3. Emergency department outcomes of the patients

	Number (n)	Percentage (%)
Discharge from the emergency room	190	66
Ward admission	63	21.9
Intensive care hospitalization	26	9
Treatment refusal	7	2.4
Referral to external center	2	0.7

Table 4. Final diagnoses of patients hospitalized in the ward and intensive care unit

Diagnoses of patients admitted to the department (n=63)			Diagnoses of patients admitted to intensive care (n=26)		
Diagnose	Number (n)	Percentage (%)	Diagnose	Number (n)	Percentage (%)
COVID-19	11	17.5	Pneumonia	10	38.5
Pneumonia	8	12.7	Meningoencephalitis	8	30.8
Pyelonephritis	8	12.7	COVID-19	3	11.5
Appendicitis	5	7.9	Other	3	11.5
Urinary infection	4	6.3	Febrile neutropenia	1	3.8
Meningoencephalitis	4	6.3	Urinary infection	1	3.8
Febrile neutropenia	4	6.3	**Overall**	26	100
Gastroenteritis	3	4.8			
Cellulite	3	4.8			
Perimyocarditis	3	4.8			
Other	3	4.8			
Cholecystitis	2	3.2			
Diverticulitis	2	3.2			
Orbital cellulitis	1	1.6			
Fever of unknown cause	1	1.6			
COVID-19 vaccine side effect	1	1.6			
Overall	63	100			

The diagnoses of 26 patients admitted to the intensive care unit were examined and it was observed that the most common diagnosis was pneumonia (n=10), and the second most common diagnosis was meningoencephalitis (n=8). The final diagnoses of patients admitted to the ward and intensive care unit are given in Table 4.

DISCUSSION

The most common reason for admission to the emergency department in which we detected high fever was sore throat (27.4%), which is consistent with the literature.

In their study, Süer et al.[5] found that the most common reason for admission to the emergency department in patients with high fever was sore throat, with a rate of 29.3%. When the reasons for admission of the pediatric age group with high fever were examined, the most common reason was found to be sore throat.[6-8]

In a surveillance study examining patients applying to the emergency department, the most common diagnosis in patients presenting with head and neck complaints was found to be upper respiratory tract infections in 11.5%.[9]

In a study examining emergency department patient characteristics, the frequency of patients diagnosed with upper respiratory tract infections was reported as 24.1%.[10] In a similar study, this rate was determined as 29.4%.[11] When the final diagnoses of the patients were examined, it was seen that the most common diagnosis was acute tonsillitis (34.4%), followed by COVID-19 disease (10.4%), pneumonia (8.7%) and urinary tract infection (7%). The fact that those diagnosed with COVID-19 disease are in the second place may be due to the continuation of the COVID-19 pandemic, especially in the first half of the two-year period in the study.

In our study, 21.9% of the patients were admitted to the ward (n=63) and 9% to the intensive care unit (n=26), and the hospitalization rates were found to be high compared to the literature.[3,5] Additionally, diagnoses such as meningoencephalitis (4.5%) and pyelonephritis (3.5%) were detected at a high rate in our study. We think that the reason for this high rate may be that our hospital is the only center that provides tertiary emergency department in our city and is the reception center for patients with comorbid diseases, undiagnosed or high-risk patients.

In their review, Wright et al.[12] stated that the source of fever could not be determined in approximately 8% of patients. In the study conducted by Colpan et al.[13], it was found that there was a similar rate of fever cases of unknown cause. However, it is known that this rate is higher in children. In particular, in a review by Chow and Robinson[14] that analyzed 18 articles, it was shown that 23% of the etiology of fever in children could not be detected and 9 to 20% were non-infectious etiologies. In their study, Seguin et al.[15] found infectious causes in 62% of hospitalized patients with high fever lasting more than 5 days, non-infectious causes in 31%, and fever of unknown cause in 7%. In our study, the rate of non-infectious causes was found to be 3.8%, and the rate of fever of unknown cause was 1.4%. These rates are low compared to the literature. This may be because the study was retrospective and only examined patients who applied to the emergency department.

Limitations

There are some limitations in our study. Since our study was retrospective and the data were obtained from patient files and HIMS records, some febrile cases may have been missed. Additionally, since the study was conducted in a single-center university hospital emergency department that provides tertiary emergency departments, the rates do not include all febrile cases.

CONCLUSION

As a result, cases with high fever detected in the emergency department may have a wide range of etiologies, from mild viral upper respiratory tract infections to potentially fatal infections such as meningoencephalitis and myocarditis. Additionally, non-infectious etiologies can also cause high fever. For this reason, in cases with fever in the emergency department, non-infectious causes should also be kept in mind, as well as infectious causes that may be serious in terms of the focus of fever.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of Manisa Celal Bayar University Faculty of Medicine Clinical Researches Ethics Committee (Date: 20.03.2023, Decision No: E-85252386-050.04.04-512096).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

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Author Contributions

All of the authors declared that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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