



Air temperature impacts on the non-variceal upper gastrointestinal bleeding

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ABSTRACT

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Objective: We set out to investigate the relationship between daily air temperature and the incidence of non-variceal upper gastrointestinal bleeding in patients admitted to the Gastroenterology Department of Firat University Hospital.

Materials and Methods: This study was a retrospective assessment of the electronic medical records of 56 patients hospitalized to the Gastroenterology Department at Firat University Hospital. The patients were admitted presenting with symptoms of hematemesis and/or melena. The aim of the study was evaluation of the effect of weather condition (air temperature) on the incidence of non-variceal upper gastrointestinal hemorrhage (gastric or duodenal ulcers) identified during upper gastrointestinal endoscopy from 2022 to 2023.

Results: The study cohort comprised 56 patients, of whom 39 (69.6%) were male and 17 (30.4%) were female. All patients presented with symptoms of melena and 24 (42.8%) also exhibited hematemesis. A total of 51.8% of patients were using non-steroidal anti-inflammatory drugs (NSAID), while 32.7% were taking antiplatelet and anticoagulant medications. It was observed that 25 cases (44.6%) occurred on days with an air temperature below 18°C, while 31 cases (55.4%) occurred on days with an air temperature above 18°C. With regard to age, 39 (69.6%) of the patients were over 60 years of age. Despite significant bleeding from the ulcer in accordance with the Forrest classification in this age group, patients under 60 years of age had longer periods of hospitalization, both in the inpatient ward and the intensive care unit. Furthermore, patients under 60 years of age had a higher risk of requiring replacement of an oesophageal stent (ES).

Conclusion: Non-variceal upper gastrointestinal bleeding (UGIB) is a serious condition with high mortality and morbidity rates. There is currently a paucity of data in the literature regarding the relationship between UGIB and air temperature. Consequently, further studies are required to elucidate this relationship.

Keywords: air temperature, non- variceal, upper gastrointestinal bleeding

1. INTRODUCTION

Upper gastrointestinal bleeding (UGIB) is a highly prevalent clinical condition in the emergency department, with considerable mortality and morbidity. Patients presenting with upper gastrointestinal bleeding typically present to the emergency department with melena, characterized by the presence of black tar-like stool, originating from the proximal part of the ligament of Treitz. Alternatively, they may present with hematemesis, or vomiting of blood, originating from the proximal part of the ligament of Treitz. In both cases, the presence

of 50ml of blood in the stool is sufficient to elicit these symptoms (1, 2). Upper gastrointestinal bleeding (UGIB) is more prevalent in males, and it is more common than lower gastrointestinal bleeding. Among the causes of UGIB, gastric ulcers are more common than duodenal ulcers (1-3).

The incidence and frequency of exacerbations of diseases of the gastrointestinal system exhibit seasonal variation (4).

Although peptic ulcer and peptic ulcer bleeding (PUB) can be observed on a daily basis throughout the year, the frequency of these occurrences exhibits

seasonal variation. A review of the literature reveals that the incidence of PUB is higher during the autumn and winter months. The seasonal variation in the incidence of UGIB is more pronounced, particularly in the elderly population, with a higher prevalence observed during the winter months (5-7).

The aim of the study was to assess the association between the daily air temperature and NV-UGB on hospitalization, requirement of ICU follow up and requirement of erythrocyte replacement.

2. MATERIALS AND METHODS

The following section outlines the research and publication ethics that have been adhered to in the production of this work. Approval was granted by the Non-Interventional Research Ethics Committee of Firat University on 17/05/2024. The study population comprised patients aged 18 years or over who were hospitalized in the Gastroenterology Clinic of Firat University Faculty of Medicine Hospital due to upper gastrointestinal bleeding other than varicose veins between 2022 and 2023. The patients were selected on the basis of having gastric and duodenal ulcers detected by endoscopy. The following variables were analyzed retrospectively from the hospital electronic record system: age, gender, chronic disease, medications used at the time of admission, duration of hospitalization, need for endoscopic intervention and need for erythrocyte suspension (ES) replacement. The data pertaining to the air temperature at the time of the onset of melena and hematemesis symptoms were obtained from the website of the Turkish Directorate General of Meteorology and the hospital electronic record system through the process of retrospective scanning. The patients were classified according to the Köppen climate classification, the World Health Organization classification, and the studies carried out as previously described. The lowest temperature suitable for the human body in terms of comfort is 18 degrees Celsius. Therefore, the patients were also divided into two groups: those who were exposed to temperatures below 18 degrees Celsius and those who were exposed to temperatures above this threshold. Elazığ is classified as belonging to the semi

-arid steppe cold climate group according to the Köppen climate classification system. The data were analyzed using the SPSS 22 package programme. Continuous variables were expressed as mean \pm standard deviation. Categorical variables were expressed as a percentage. Continuous variables were expressed as mean \pm standard deviation. Student t test and Mann Whitney U tests were used for the comparison of groups.

The inclusion criteria for the study were as follows

1. Age of ≥ 18 years
2. First time to apply to the emergency department with upper gastrointestinal bleeding
3. Endoscopy performed within the first 12 hours after hematemesis or melena
4. Non-variceal upper gastrointestinal bleeding

The exclusion criteria for the study were as follows

1. Patients with prior peptic ulcer
2. Patients with esophageal ulcer
3. >12 hour time period between hematemesis and endoscopic assessment

3. FINDINGS

Of the 56 patients included in the study, 39 (69.6%) were male and 17 (30.4%) were female. The mean age of the cohort was 64.7 ± 15.6 years. Melena was observed in all patients, while 24 (42.8%) also exhibited hematemesis. A history of current use of non-steroidal anti-inflammatory drugs (NSAID) was reported in 51.8% of patients, while 32.7% were using antiaggregant or anticoagulant drugs. A total of 75% of patients were using non-steroidal anti-inflammatory drugs (NSAID) or antiaggregant/coagulants, while three patients were using both antiaggregant and NSAID.

In cases of non-variceal upper gastrointestinal bleeding, there was a significant association between the occurrence of bleeding and the temperature of the air. Of the cases, 25 (44.6%) bleeding events occurred when the temperature was below 18 Celsius, whereas 31 (55.4%) occurred above 18 Celsius. Follow up time in the ICU, total hospital stay and requirement for erythrocyte replacement were higher in group above 18°C however the difference was not statistically significant (Figure 1).

Table 1: Comparison of the number of ES replacement needs, length of hospital stay and length of stay in the intensive care unit in individuals over 60 and under 60 years of age

	Age	N	Mean	ss	p
Stay days in hospitalization	Under 60	17	4.47	3.608	0.019
	Over 60 years	39	4.08	1.441	
Stay days in intensive care	Under 60	17	2.35	2.149	0.035
	Over 60 years	39	1.87	0.811	
Need for es replacement	Under 60	8	2.25	1.832	0.028
	Over 60 years	26	2.15	1.156	

Table 2: Frequency of non-variceal upper gastrointestinal bleeding by months and seasons

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Bleeding(n)	6	3	6	4	2	4	12	2	6	1	7	3
Bleeding rate (%)	10.7	5.4	10.7	7.1	3.6	7.1	21.4	3.6	10.7	1.8	12.5	5.4
Temperature	4.67 ±1.6	-2.67 ±1.5	4.67 ±2.6	16.75 ±1.2	17±1.4	22.75 ±2.5	30.33 ±3.2	32	34.5 ±1.8	24	16.57 ±5.4	9.67 ±1.1
		Winter			Spring			Summer			Autumn	
Bleeding(n)		15			10			20			11	
Bleeding rate(%)		26.8			17.9			35.7			19.6	
Temperature		3.2±3.6			19.2±3.4			31.75±3.2			15.36±6	

The age of the patients was recorded as over 60 years of age in 39 cases (69.6%). The prevalence of advanced ulcer stages (i.e., Forrest stages III–IV) was higher among individuals aged ≥60 years compared to those aged ≤60 years (p=0.002). Conversely, patients aged ≤60 years had longer hospitalizations, longer intensive care unit stays, and a higher incidence of ES replacement (Table 1). Endoscopic therapy with bipolar, argon plasma coagulation and haemoclips was performed on all ulcers above Forrest-2b to stop the bleeding or prophylaxis (4, 3, and 14 patients, respectively). This was deemed to be indicative of the beneficial impact of endoscopic intervention on patient outcomes.

The average duration of hospitalization was 4.2 ± 2.3 days, with 2.02 ± 1.3 days spent in the intensive care unit. A total of 34 patients (60.7%) received an average of 2.18 ± 1.3 units of erythrocyte suspension, while 22 patients (39.2%) required no replacement therapy. Two (3.6%) patients succumbed to an acute myocardial infarction during the course of their hospitalization.

The most common presentation of non-variceal UGIB occurred during the summer months, representing 35.7% of cases. This was followed by winter (26.8%), autumn (19.6%), and spring (17.9%). The data revealed that the month with the highest frequency of presentation was June (21.4%), while the lowest was

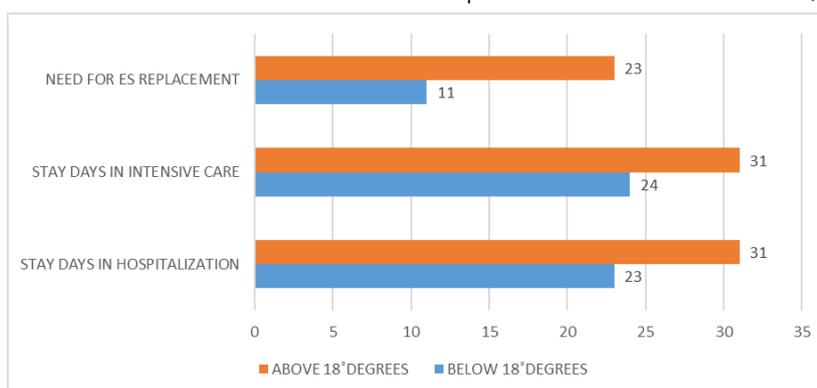


Figure 1: Comparison of the number of need for ES replacement, length of hospitalization and intensive care unit stay according to below 18 Celsius and above 18 Celsius groups

observed in September (1.8%). These findings are presented in (Table 2.)

4.DISCUSSION

Non-variceal upper gastrointestinal bleeding (UGIB) is a prevalent condition with a high mortality and morbidity rate in the emergency department. A substantial body of evidence from national and international studies indicates that seasonal change, seasonal change-related drug use habits and the position of the sun effect the etiology of UGIB.

In a study conducted by Zhaoli Fu et al. (8), it was observed that the incidence of UGIB was highest in January and subsequently declined until August, at which point it reached its peak. In a study by Lenzen et al., it was found that the incidence of bleeding was higher during the winter months and at night in patients admitted to the emergency department due to gastrointestinal bleeding. The study found that 62.5% of the patients were male, with a mean age of 59.1 years. In a study by Ekmen et al. (10), it was observed that non-variceal UGIB was most prevalent in males and during the summer months, with the duodenum representing the most common location. In the study by Kefeli et al. (11), it was observed that non-variceal UGIB was particularly prevalent during the summer months and was most commonly attributed to duodenal ulcers. Additionally, nearly half of the patients had a history of NSAID use, with this being more prevalent in cases of gastric ulcers than in those of duodenal ulcers.

Furthermore, nearly half of the patients had a history of non-steroidal anti-inflammatory drug (NSAID) use, with this being more prevalent in cases of gastric ulcers than in those of duodenal ulcers. In the present study, 56 patients who presented to the emergency department with active melena and hematemesis and who had gastric and duodenal ulcers on emergency endoscopy were included in the analysis. Of the patients, 39 (69.6%) were male and 17 (30.4%) were female. The mean age of the patients was 64.7±15.6 years. While 51.8% of the patients were currently using NSAID, 32.7% were taking antiaggregant or anticoagulant medications. In the

course of our study, the highest incidence of bleeding was observed in June, with the highest number of cases occurring during the summer months. Although our results were similar to those of previous studies conducted in Türkiye, they were contradictory to those of studies conducted abroad. This may be attributed to the high prevalence of NSAID use among our patients, which persists throughout the year and is consistent with findings from previous studies conducted in Türkiye. The male-to-female ratio among our patient cohort was 69.6% male, which aligns with the findings of both domestic and foreign studies. To elucidate the underlying cause, a comprehensive examination of the patients' comorbidities and lifestyle habits was imperative. However, given the retrospective nature of the study, the available data were inherently constrained.

A total of 39 (69.6%) of the patients were over the age of 60 years ($p=0.002$). However, the necessity for ES replacement and the length of hospital and intensive care unit stays were less than those observed in patients younger than 60 years. An examination of the relationship between daily temperature and the occurrence of cases revealed that 25 (44.6%) of the patients were admitted on days when the air temperature was below 18°C, while 31 (55.4%) were admitted on days when the air temperature was above this threshold. With regard to the duration of hospitalization in the intensive care unit and the need for ES replacement, the air temperature was higher than 18 degrees Celsius, although this was not statistically significant. In this regard, Wu et al. (12) observed in their investigation of patients with esophageal variceal bleeding (EGVB) that a reduction in air temperature by 5°C was associated with an increased risk of EGVB by 14.4–30.7%. However, our findings yielded disparate results. This discrepancy may be attributed to the fact that low air temperature has been demonstrated to elevate blood pressure in variceal bleeding. Additionally, the absence of angiodysplasia, esophageal and fundus varices in our patient cohort may provide a rationale for the contrasting outcomes observed in our study and that

of Wu et al. (12).

The limitations of our study are as follows: firstly, the number of patients included was relatively low; secondly, the lack of data on lifestyle and comorbidity in the patients, which was due to the retrospective nature of the analysis. A more comprehensive examination of the data and further analysis of a greater number of patients would have yielded additional insight and strengthened the conclusions of our study.

5.CONCLUSION

The incidence of bleeding from gastric and duodenal ulcers other than varicose veins is highest during the summer months, when the air temperature is above 18 degrees Celsius. It has been observed that the condition is more prevalent in male patients than in female patients, and that it is more common in the elderly population than in the young population.

The analysis revealed no statistically significant correlation between gastric and duodenal ulcer bleeding and air temperature above and below 18 degrees Celsius. It is our contention that further research, conducted at multiple centers with a larger number of patients, is required to provide greater clarity on this issue.

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