Erciyes Med J 2021; 43(4): 355–60 • DOI: 10.14744/etd.2020.25826
ORIGINAL ARTICLE – OPEN ACCESS

Frequency of Epistaxis by Months and Daytime Hours

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ABSTRACT

Objective: Epistaxis, which is a common otorhinolaryngologic emergency, is not a disease itself but an important nose symptom. It affects 60% of the population at any given life stage. However, only 6% seek medical attention. This study aims to investigate the daily and monthly variations and frequency of epistaxis and to determine the relationship between bleeding foci and comorbidities.

Materials and Methods: The study involves examining the retrospective records of patients who presented with epistaxis to Kahramanmaraş Sütçü İmam University, Medical Faculty's Otorhinolaryngological Unit. Parameters evaluated include age, sex, bleeding time, comorbidities, arterial blood pressure, bleeding site, and month of presentation. The bleeding occurrence time was categorized as morning (06:01–12:00), afternoon (12:01–18:00), evening (18:01–00:00), and night (00:01–06:00).

Results: Seven hundred and thirty-five patients presented with epistaxis during March 2015–December 2019. One hundred and fourteen patients (19.6%) experienced epistaxis in the morning, 60 (8.2%) in the afternoon, 408 (55.5%) in the evening, and 123 (16.7%) in the night. Epistaxis was more common in the morning and evening in hypertensive patients and in the evening in other comorbidities (p=0.005). Bleeding rate was higher in the evening in all months (p=0.002). Increased epistaxis frequency in winter was statistically significant (p=0.027). Posterior epistaxis cases were the elderly, hypertensive, and having increased comorbidities (p>0.001).

Conclusion: In general, bleeding cases were high in winter and in the evening. Comorbidities were found to be among the provocative factors for epistaxis, especially of posterior origin. This shows that circadian rhythm is effective in epistaxis.

Keywords: Epistaxis, time of day, circadian rhythm, comorbidity

Cite this article as:
Yıldız MG, Orhan İ, Kara İ, Bilal N, Güzelsoy Sağıroğlu S, Doğaner A. Frequency of Epistaxis by Months and Daytime Hours. Erciyes Med J 2021; 43(4): 355-60.

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Submitted
08.09.2020

Accepted
20.12.2020

Available Online
27.05.2021

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INTRODUCTION

Hemorrhage that occurs in the nasal cavity as a result of mucosal damage caused by vascular pathology or coagulation disorders is called epistaxis or nose bleeding (1). Although the true incidence remains unknown, it has been reported that it is seen in 7–60% at any life stage and that only 6% of these patients seek medical attention (2). Since the majority of the epistaxis episodes can be controlled by patient's own interventions and thus remain highly unreported, most of these patient records are not available in health institutions (3). However, persistent and recurrent bleeding may occur in a small group of patients (4). To prevent possible complications, patients who present with epistaxis should be evaluated promptly and treated urgently. Although the incidence and management of bleeding in patients with nasal bleeding problems is well documented in literature, there are not enough studies shedding light on the occurrence of bleeding in course of the day. Our study aims to determine whether epistaxis exhibits monthly variations, to determine the bleeding occurrence time of the day, and to also evaluate the relationship between this condition and the circadian rhythm which is the body's physiological cycle.

MATERIALS and METHODS

Approval was obtained from the Clinical Research Ethics Committee (2020/31), and the study was conducted in accordance with the Helsinki II Declaration and Guidelines for Good Clinical Practice, and informed consent was obtained from the patients included in the study. This study represents a retrospective review of records of patients who were evaluated for epistaxis under the diagnosis code "R04.0 ICD-10" in the Otorhinolaryngology Clinic between the year 2015 and 2019. Patients included in the analysis were those whose epistaxis onset period was identified from anamnesis obtained from patients or relatives. Patients whose bleeding onset time was not found in the records, as well as those with nasal inflammatory conditions such as allergic rhinitis and upper respiratory tract infection, and those who had nasal trauma, nasal surgery, and intranasal tumor were excluded from the study. In addition, local factors such as nasal inflammation-related allergic rhinitis and upper respiratory tract infections,

which are important provocative factors for epistaxis that may disrupt the circadian rhythm (5) and can cause time-independent nosebleeds (6) were also excluded from the study.

Patients' age, gender, bleeding onset time, comorbidities, arterial blood pressure, bleeding site, and month of bleeding occurrence were recorded. As stated in the Turkish Hypertension Consensus Report, blood pressure measurements were performed using manual sphygmomanometer after having the patient rest for 5 min in an examination chair at the time of admission in a quiet environment at room temperature (7). Invasive procedures and surgical interventions performed to manage the bleeding were recorded. Patients were categorized into four groups based on bleeding onset time as follows: Morning (06.01–12.00), afternoon (12.01–18.00), evening (18.01–00.00), and night (00.01–06.00).

Statistical Method

The suitability of the data to normal distribution was tested using the Kolmogorov–Smirnov test. Group comparisons of variables with normal distribution were performed using the one-way ANOVA. The distributional difference between categorical variables was performed using Chi-square and exact test. The study was supported by tables and graphics. P<0.05 was accepted to be statistically significant. Statistics parameters are expressed in mean±SD. The data were evaluated using IBM SPSS version 22.

RESULTS

It was determined that 1080 patients visited our otorhinolaryngology clinic between March 2015 and December 2019 due to epistaxis. This study was conducted in 735 patients whose bleeding onset time was found in the records. Patients whose bleeding onset time was not in the records, as well as those with nasal inflammatory conditions such as allergic rhinitis and upper respiratory tract infection, and those who have had nasal surgery and intranasal tumor summed up to 345 were excluded from the study. Four hundred and twenty-two patients (57.4%) included in the study were male and 313 patients (42.6%) were female. The mean age was 41.94 + 22.22 (age range of 1–80 years). When the relationship of epistaxis according to age was evaluated, a bimodal pattern was observed (Fig. 1). The mean systolic blood pressure value of the patients was 125.50 + 23.79, and the mean diastolic blood pressure value was 77.84 + 13.39. Among the patients evaluated for epistaxis, 149 cases (20.3%) suffered from hypertension, 61 cases (8.3%) were diabetic, 56 patients (7.6%) were on antiaggregant-anticoagulant medications, 26 patients (3.5%) suffered from hemophilia, 24 cases (3.3%) had leukemia, and 14 cases (1.9%) had chronic kidney failure.

It was determined that 408 (55.5%) of all the patients included in the study experienced epistaxis occurrence in the evening hours. Nosebleeds were more common in men. A borderline statistical significance was found between sex and the temporal distribution of epistaxis during the day. It was observed that there was more bleeding occurrence in the evening hours in both sexes. Although there was no statistically significant difference in blood pressure levels, higher levels were observed in the morning and evening hours. While approximately 83.8% of the patients had bleeding from the anterior nasal portion, there was no statistically significant difference between epistaxis foci and temporal distribution of epistaxis occurrence in the day. A statistically significant difference was found between temporal distribution of epistaxis in the day and comorbidities. Bleeding was observed more frequently in the morning and evening hours in hypertensive patients. In other comorbidities, it was found that the bleeding occurrence was more common in the evening hours only (Table 1). Nosebleeds were mostly seen in the evening in all months of the year (p<0.05) (Fig. 2).

In the evaluation of epistaxis based on site, epistaxis was more common during the winter months (p<0.05) (Fig. 3). Patients with posterior bleeding foci were in the advanced age group (p<0.001). Systolic and diastolic blood pressure values were higher in patients with posterior foci epistaxis (p<0.001). While epistaxis was seen more in male patients, the prevalence of male patients with posterior and diffuse bleeding sites was of high statistical significance (p<0.001). When the relationship between epistaxis site and comorbidity was assessed, the excess of comorbid conditions, especially in patients with a posterior bleeding focus, was statistically significant (p<0.001) (Table 2).

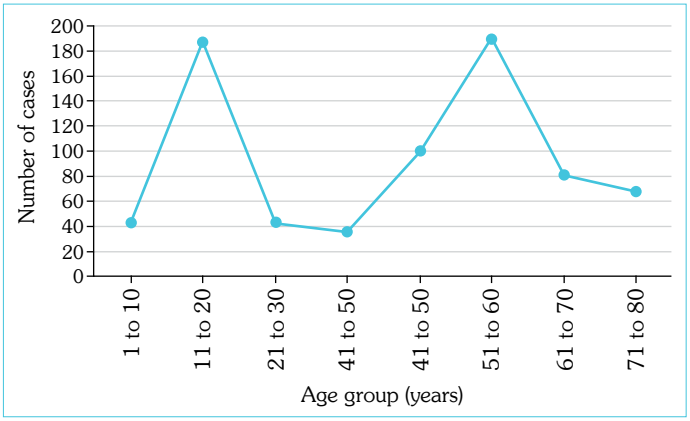

Figure 1. Age distribution of patients with epistaxis. Note the bimodal distribution

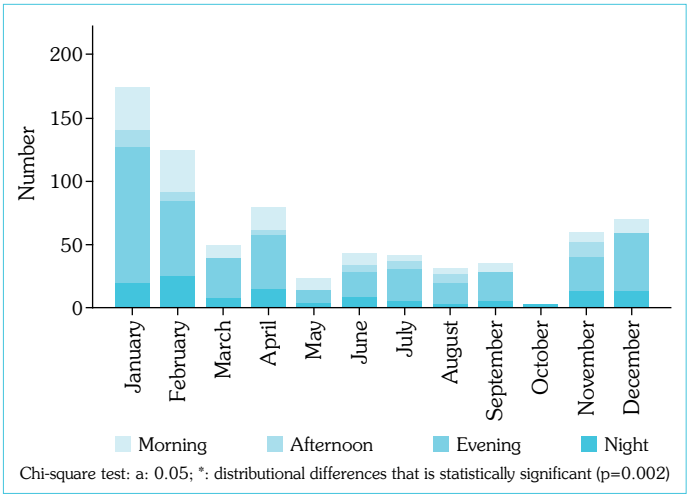

Figure 2. Distribution by bleeding onset time and month of presentation in epistaxis (p=0.002). Morning (6:01 am–12 pm), afternoon (12:01 pm–6 pm), evening (6:01 pm–12 am), or overnight (12:01 am–6 am)

Table 1. Distribution by bleeding onset time and clinical features in epistaxis patients and relationship between bleeding onset time, comorbidities, and bleeding site in epistaxis

	Morning	Afternoon	Evening	Night	p
Age, Mean±SD	42.55±22.94	42.02±20.69	41.54±22.29	42.52±22.10	0.956
SBP, Mean±SD	134.28±26.30	122.92±15.87	129.44±24.63	122.51±20.49	0.098
DBP, Mean±SD	82.28±14.87	76.33±10.08	79.94±13.73	76.54±11.69	0.306
Male, n (%)	71 (16.8)	33 (7.8)	250 (59.2)	68 (16.1)	0.081
Female, n (%)	73 (23.3)	27 (8.6)	158 (50.5)	55 (17.6)	
Site of epistaxis, n (%)					0.364
Anterior	121 (19.6)	55 (8.9)	340 (55.2)	100 (16.2)	
Posterior	16 (20.5)	1 (1.3)	47 (60.3)	14 (17.9)	
Broad	7 (17.1)	4 (9.8)	21 (51.2)	9 (22.0)	
Comorbidity, n (%)					0.005*
Antiaggregant/Anticaogulant	6 (10.7)	5 (8.9)	41 (73.2)	4 (7.1)	
DM	7 (11.5)	7 (11.5)	37 (60.7)	10 (16.4)	
Hemophilia	3 (11.5)	2 (7.6)	15 (57.8)	6 (23.1)	
HT	43 (28.9)	9 (6.0)	76 (51.0)	21 (14.1)	
CKF	1 (7.1)	3 (21.4)	9 (64.3)	1 (7.1)	
Leukemia	3 (12.5)	4 (16.7)	14 (58.3)	3 (12.5)	
None	75 (18.5)	29 (7.2)	223 (55.1)	78 (19.3)	

One-way ANOVA; Chi-square test; exact test; a: 0.05; *: Distributional differences statistically significant; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation; HT: Hypertension; DM: Diabetes mellitus; CKF: Chronic kidney failure

Table 2. Relationship between comorbidities and nose bleeding site and clinical features

	Anterior	Posterior	Broad	p
Age, Mean±SD	39.32±21.25[b]	63.91±14.19[a,c]	39.59±26.05[b]	<0.001*
SBP, Mean±SD	122.53±20.92[b]	152.31±29.74[a,c]	119.02±19.44[b]	<0.001*
DBP, Mean±SD	76.03±11.70[b]	93.27±16.73[a,c]	75.61±11.30[b]	<0.001*
Male, n (%)	325 (77.0)	61 (14.5)	36 (8.5)	<0.001*
Female, n (%)	291 (93.0)	17 (5.40)	5 (1.6)	<0.001*
Comorbidity, n (%)				
Antiaggregant/Anticaogulant	39 (69.6)	9 (16.1)	8 (14.3)	
DM	54 (88.5)	3 (4.9)	4 (6.6)	
Hemophilia	20 (76.9)	4(15.3)	2(7.8)	
HT	104 (69.8)	41 (27.5)	4 (2.7)	
CKF	12 (85.7)	1 (7.1)	1 (7.1)	
Leukemia	19 (79.2)	4 (16.7)	1 (4.2)	
None	362 (89.4)	20 (4.9)	23 (5.7)	

One Way Anova: Exact test; *: 0.05 statistically significant; a: Statistically significant with anterior group; b: Statistically significant with posterior group; c: Statistically significant with broad group; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation; HT: Hypertension; DM: Diabetes mellitus; CKF: Chronic kidney failure.

Procedures such as nasal compression, cold application, anterior and/or posterior packing, and cauterization were performed in the patients to manage the bleeding (Fig. 4). Hospitalization period ranged from 1 to 12 days. Approximately 101 patients (13.7%) were hospitalized and followed up in the ENT ward. Forty-nine of these patients required cardiological consultation, 35 required hematological, 17 required internal medical, and 1 case required pulmonological consultation. While the hospital stay period was observed to be 3±1.5 days in patients whose epistaxis was managed using conservative methods, this period extended to 5±1.5 in patients who received posterior packing treatment and 7±2.5 days in those who underwent endoscop-

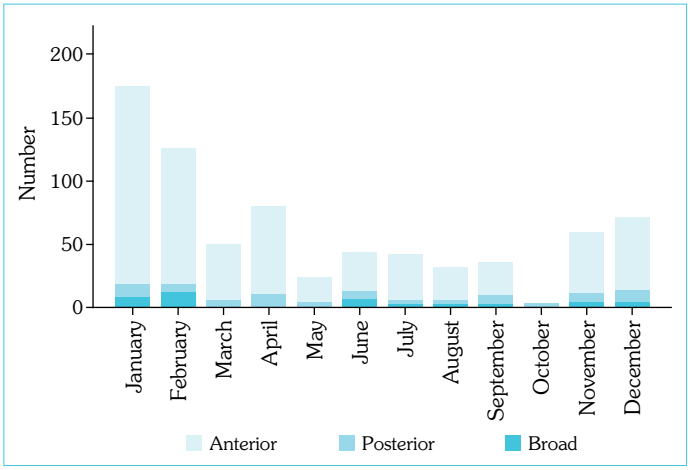

Figure 3. Distribution by bleeding site and month of presentation in epistaxis

Exact test; a: 0.05; *distribution difference is statistically significant (p=0.027)

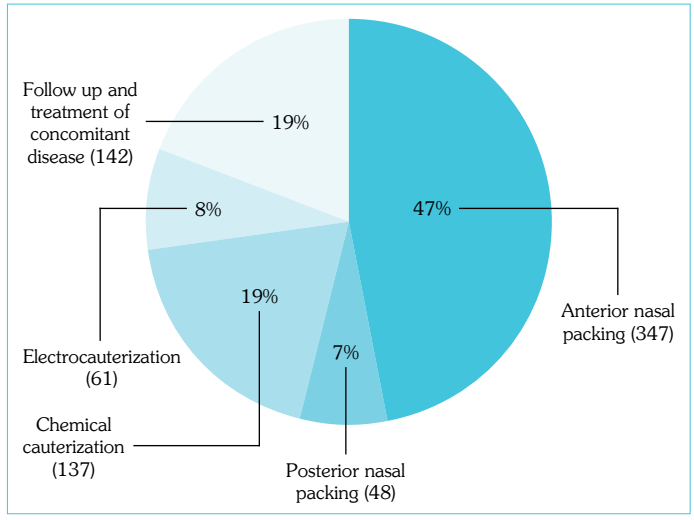

Figure 4. Treatment methods applied to patients. There is no statistically significant difference between treatment modalities (p>0.05)

ic cauterization. There was no statistically significant difference between the treatment modalities and the duration of hospitalization (p>0.05).

DISCUSSION

Epistaxis is one of the common emergency conditions encountered by otorhinolaryngologists. Active nasal bleeding occurs in approximately 5–10% of the general population every year (8). Less than 10% of these patients present to the physician with this problem and only one-tenth of them are hospitalized for treatment (9). Hospitalization was required in 13.7% of the patients evaluated in our study. Epistaxis incidence varies with age. The incidence of epistaxis shows bimodal distribution. The first peak is observed in childhood. The second peak is the seen in the adulthood ages of 45–65 years (4, 10). In a study conducted by Chaaban et al. (11), it was reported that the incidence of epistaxis increases with age in the geriatric population. In our study, a bimodal distribution was detected in the relationship between epistaxis and age of patients thus correlating well with previous reports in literature. Peaks at age groups 11–20 years and 51–70 years were observed.

It was reported that the prevalence of epistaxis tends to be higher in males (58%) than in females (42%) and 71.4% of the patients were over 50 years of age (12). In one study, Sethi et al. (13) found that the average age of patients who visited the emergency room for nose bleeding was 53.4 and that 52.7% of them were male. In a study conducted by Afshar et al. (14), it was stated that the incidence of epistaxis is higher in the male population. Contrarily, Shaw et al. (15) reported epistaxis detection in 47% of men and 53% of women in their study, and 70% of the patients were over 50 years of age. In our study, it was found that 57.4% of the patients were male, 42.6% were female and the average age was 41.94.

The temporal change of epistaxis during the day is a matter that requires to be addressed in clinical studies. Studies linking the occurrence of epistaxis at certain periods of the day with the circadian rhythm are limited. In a study conducted by Manfredini et al. (16) on 1741 cases of epistaxis reported that the time of occurrence of epistaxis showed a biphasic circadian pattern throughout the day. According to this study, it was observed that epistaxis peaked between 0400–1000 h and between 1600 and 2400 h. In our study, 55.5% of the patients experienced bleeding occurrence time in the evening hours.

It is a known fact that circadian rhythm plays an important role in the pathophysiology of some diseases. Circadian rhythm is important in the pathophysiology of cardiovascular diseases. The occurrence of myocardial infarction which is a disease entity in this group is more frequent in the early morning hours and this is due to the circadian rhythm-related increase in blood pressure, heartbeat, and vascular tone in the coronary vessels in the early morning hours (17). In a study conducted by Sakata et al. (18), it was found that patients who were followed up and treated for hypertension had high morning and evening blood pressure values and this difference was found to be statistically significant. There are many studies on the relationship between epistaxis and hypertension, and an exact correlation could not be established with the evaluation of all these studies (19). In a study conducted by Isezuo et al. (20), it was stated that their findings supported the association between epistaxis and hypertension. In a study conducted by Kim et al. (21), the blood pressure values of the patients who presented with epistaxis were found to be significantly higher than the control group. In some publications, it has been stated that hypertension does not have a direct correlation with epistaxis and can be included among the idiopathic causes (22). In our study, a statistically significant difference was found between a temporal variation of epistaxis and hypertension. Hypertension was detected in 20.3% of the patients and bleeding occurrence time in the morning and evening hours was more common. This pattern can be illustrated using the circadian rhythm.

Apart from myocardial infarction, circadian rhythmical changes also play an important role in the pathophysiology of other diseases such as ischemic cerebrovascular disease and venous thromboembolism. Frequent occurrence of ischemic cerebrovas-

cular diseases in the morning hours between 0600 and 1200 was associated with serum cortisol levels peaking in the morning hours (23). Frequent occurrence of venous thromboembolism in the morning is also associated with the changes in circadian rhythm (24). This phenomenon is partly due to hematological parameters including blood viscosity and clotting factors peaking in the morning hours displaying circadian rhythm (25). In a study by Kim et al. (26) which examined the variation of bleeding frequency in the day in post-tonsillectomy found that bleeding was observed more frequently at night. In our study, the high prevalence of epistaxis occurrence in the evening hours in patients with comorbid conditions such as diabetes mellitus, hemophilia, antiaggregant-anticoagulant medication usage, leukemia, and chronic renal failure was found to be statistically significant. This can be illustrated using the circadian rhythm.

The site of origin of 5–10% of epistaxis is in the nasal septum or lateral nasal wall and cannot be visualized by anterior rhinoscopy. Such bleeding is referred to as posterior epistaxis. Conditions where the bleeding site can be viewed using anterior rhinoscopy are called anterior epistaxis. In cases where bleeding is caused by multiple foci, the term broad epistaxis is used (27). There are many studies that draw attention on the epistaxis-climate-temperature relationship. In a study conducted by Purkey et al. (28), it was found that the incidence of epistaxis was higher in the cold seasons. In the study conducted by Glikson et al. (29), the frequency of epistaxis was found to be higher in the winter months. In our study, it was found that bleeding in all epistaxis sites was higher in the winter months and was statistically significant. When evaluated based on age, posterior originating epistaxis is more common in elderly patient group (30). In addition, blood pressure levels were higher in epistaxis cases of posterior origin (31). In these patients, the incidence of additional diseases is higher due to advancement in their age (32). In our study, in accordance with literature, it was found that patients with posterior foci bleeding were the elderly and their blood pressure values were high. In addition, comorbid conditions were observed more frequently in this patient group.

The management of epistaxis enjoys a wide coverage of treatment options ranging from non-invasive strategies such as nasal compression to invasive techniques such as surgical ligation and embolization. The most common interventions are nasal compression, topical vasoconstrictor agent use, and packing (33). Recurrent epistaxis and long periods of hospitalization depend on factors such as poorly controlled systemic diseases, failure to stop medications that increase bleeding tendency, and the application of invasive interventions (34, 35). There are publications documenting that electrocauterization has a higher success rate in terms of recurrent epistaxis and significantly reduces hospital stay (36, 37). In our study, it was observed that the duration of hospitalization prolonged when electrocauterization procedures were performed. This can be explained by the general condition of such patients treated and the need for medical treatment due to their systemic disease.

The limitations in our study include a retrospective research in a single tertiary health board and difficulties in obtaining clear expressions from patients in the identification of bleeding occurrence time. These restrictions may create a deficiency in illuminating the pathophysiology.

CONCLUSION

Epistaxis is a condition that should be handled seriously. Our study reveals that there is a significant difference between epistaxis episodes occurring in the evening hours and comorbid conditions. In addition, epistaxis is observed more frequently in winter months. Our findings support clinical experiences and may point out a more detailed pathophysiology of nosebleeds.

Ethics Committee Approval: The Kahramanmaraş Sütçü İmam University Clinical Research Ethics Committee granted approval for this study (date: 04.03.2020, number: 31).

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

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – MGY, İO; Design – MGY, İO; Supervision – NB, SGS; Resource – AD; Materials – İK, NB; Data Collection and/or Processing – İK, SGS; Analysis and/or Interpretation – AD, MGY; Literature Search – NB, İK; Writing – MGY, İO; Critical Reviews – AD, SGS.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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