

Prospective review of 188 cases of epistaxis presenting to the emergency department: Etiology and outcome

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ABSTRACT

Background: Due to a myriad of risk factors, epistaxis is a very frequent presentation to the emergency room (ER). This study aims to ascertain the prevalence of epistaxis in our population, risk factors, effectiveness of ER treatment, complications, and ER outcome. **Materials and Methods:** This was a prospective observational study performed in the ER of a referral tertiary care center in south India. Data were categorized, coded, and analyzed to determine the objective of the study. **Results:** During the study's six-month duration, 188 (0.6%) patients presented with epistaxis. The mean age was 42.9 (SD: 16.49) years, with a male preponderance of 143 (76.1%). A majority of these patients (n : 156; 82.9%) were triaged as priority II, with hypertension (n : 53, 28.2%) as the commonest comorbidities. Trauma-related epistaxis (n : 107, 56.9%) was the most frequent cause. Anterior nasal packing was carried out for 85 (45.2%) patients, posterior nasal packing was carried out for one (0.5%) patient, and bleeding had spontaneously resolved in the majority (n : 102; 54.3%) patients. Seven (3.7%; p -value: 0.001) patients had recurrent epistaxis, and of those, three (1.6%) required urgent resuscitation with crystalloid fluid and blood products. Two of these patients had bleeding dyscrasias, four had history of trauma, and one patient presented with uncontrolled hypertension. Two (1.1%) patients came back to us with recurrent bleeding within 12 h of discharge. Majority (69.2%; 130) were discharged stable, (23.9%; 45) were admitted for observation and (6.9%; 13) were discharged against medical advice. There was no mortality among these study populations. **Conclusion:** Middle-young, aged males most commonly presented with epistaxis. Most of them were secondary to trauma. Anterior nasal bleeding was the most common source and hemostasis could be obtained by anterior nasal packing. Majority could be discharged stable from the ER. However, this cohort had seen patients in life-threatening conditions, so the severity cannot be overlooked.

Keywords: Anterior nasal bleeding, emergency room, epistaxis, hypertensive urgency, nasal packing, primary health care

Introduction

Epistaxis, characterized by hemorrhage originating from the nasal cavity, is a prevalent and urgent condition encountered by emergency room (ER) physicians and primary care physicians.^[1-3]

Despite its often-benign presentation, nasal bleeding can rapidly escalate in severity and pose a threat to the patient's prognosis due to its potential for recurrence and excessive blood loss.^[4] While the etiology of epistaxis can be attributed to local or systemic factors, it is commonly idiopathic in nature.^[4] This condition not only induces anxiety in patients and their families but also exerts hemodynamic implications. Although many patients can be managed effectively within the hospital's ER department or primary health care centers, certain cases may present with complications requiring specialized care.

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Epistaxis can occur in individuals across all age groups and can be attributed to various risk factors. However, the elderly population often requires more emergent care and subsequent hospital admission due to the associated morbidity.^[5,6] It is estimated that approximately 60% of individuals worldwide experience epistaxis at some point in their lifetime, yet only a small fraction, around six percent, seek medical attention.^[7,8] The prevalence of epistaxis is higher among children under the age of ten and increases again after the age of thirty-five. Although men tend to be slightly more affected than women until the age of fifty, there is reportedly no significant difference between the genders thereafter.^[1,2,4,8] These observations highlight the wide-ranging impact of epistaxis across different age groups and gender distributions.

The etiology of epistaxis varies depending on age and anatomical location, as reported in literature. Traumatic epistaxis is more common in younger individuals (under the age of 35) and is typically associated with digital trauma, facial injury, or the presence of a foreign body in the nasal cavity.^[1,2,7] On the other hand, nontraumatic epistaxis is more prevalent in patients over the age of 50 and can be attributed to factors such as hypertensive urgency, bleeding diathesis, organ failure, neoplastic conditions, inflammation, or environmental factors such as temperature, humidity, and altitude.^[4,9] Epistaxis is further categorized based on the site of origin, namely, anterior and posterior epistaxis. It encompasses various factors including local causes (such as digital manipulation, deviated septum, trauma, or chronic nasal cannula use), systemic causes (including alcoholism, hypertension, vascular malformations, and coagulopathies), environmental factors (such as allergies or dryness prevalent in winter months), and medication-induced causes (such as certain nonsteroidal anti-inflammatory drugs, anticoagulants, topical nasal steroid sprays, or illicit drugs).^[3,4,8] Anterior nosebleeds are typically caused by injury to the Kiesselbach's plexus in the lower portion of the anterior nasal septum (Little's area), whereas posterior nosebleeds result from injury to the posterior nasal septal artery.^[2-4] Anterior epistaxis is more common, accounting for over 80% of cases, however, distinguishing between anterior and posterior epistaxis can be challenging. Although most cases of epistaxis are spontaneous and idiopathic, it is important to consider rarer etiologies such as neoplasms or vascular malformations, especially when accompanied by other symptoms like unilateral nasal obstruction, pain, or cranial nerve deficits.^[4] The term "Idiopathic Epistaxis" is frequently used in approximately 80-90% of cases.^[9,10] Children under the age of ten often experience mild epistaxis originating from the anterior nose, whereas severe epistaxis originating from the posterior nose is more common in adults over the age of fifty.^[4,11]

There is a dearth of data on patients with epistaxis in India; hence, we conducted this prospective observational study within the adult emergency department of a prominent tertiary care referral center in South India. The objective of this study was to investigate the prevalence of epistaxis in this specific

geographical region, identify the risk factors prevalent among our population, evaluate the management practices within the ER, assess the likelihood of complications or rebleeding within a 12-hour period, and analyze the overall outcomes observed in the emergency setting.

Materials and Methods

Study design

This was a prospective observational cohort study.

Setting

The present study was conducted in a tertiary care referral hospital located in Tamil Nadu, South India. The emergency department of this hospital, comprising 50 beds, caters to the medical, surgical, and trauma care requirements of approximately 75,000 patients on an annual basis.

Study period

This study was conducted over a period of 6 months (January 1, 2022–June 30, 2022).

Participants

Adult patients (≥ 18 years of age) presenting with a history of epistaxis of any etiology were included in the study after obtaining informed written consent from either the patient or a close relative. Individuals below the age of 18 and those who declined to provide a written consent for participation were excluded from the study.

Variables

Prior to commencing the study, a standardized data sheet was prepared. The medical records of the included patients were carefully examined, and the study form was completed, documenting relevant details such as medical history, clinical observations, laboratory, and radiological investigations (if applicable), as well as the assigned triage priority levels. In addition to the ER team, any other departments, or units, particularly those associated with otorhinolaryngology (ENT) or surgical care, involved in the management of the patients were also documented.

Outcome variable

Patients' ER outcomes were noted, encompassing any missed diagnoses or unexpected causes identified from other centers, as well as the treatments received at those centers. Additionally, it was noted whether the patient's required admission, could have been safely discharged, or chose to be discharged against medical advice. The potential occurrence of complications or rebleeding within a 12-hour period was also assessed. It is important to mention that our facility offers private tertiary care; however, due to financial constraints or limited availability of in-patient beds, some patients who needed admission were transferred to other facilities after receiving initial care in the ER.

Sample size

All subsequent patients presenting with epistaxis during the six months study period were included in the study.

Data source and statistical analysis

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 23.0, developed in Armonk, New York, USA. Various variables, including age, sex, comorbidities, clinical complaints, vital signs at presentation, primary care received elsewhere, occurrence of rebleeding after ER management, and ER outcome, were categorized and coded. Descriptive statistics were employed to summarize the data, with mean and standard deviation used for continuous variables and frequencies and percentages for categorical variables. Additionally, a univariate logistic regression analysis was conducted to assess the relationship between these variables. The *p*-value was calculated, and a significance level of less than 0.05 was considered statistically significant. However, it is noteworthy that none of the results yielded significant findings.

Ethical considerations

Prior to commencing the study, clearance from the Institutional Review Board (IRB) and ethical committee was obtained, as indicated by the IRB Min no: 14115 dated 07/07/2021. To safeguard patient confidentiality, specific identification documents were used, and a password-protected data entry software with limited access was utilized. The authors affirm that they possess all requisite patient consent forms, with the patients having provided consent for their clinical data to be published in the journal. Although efforts will be made to preserve the anonymity of patients and their relatives, their names and initials will not be published. However, complete anonymity cannot be guaranteed.

Results

During the six-month duration of the study, a total of 33,580 patients sought medical attention in our ER. Among them, 2,872 (8.6%) individuals presented with a history of trauma, while the remaining patients had various medical or surgical emergencies. Of these cases, 188 (0.6%) patients were specifically identified with epistaxis, as depicted in Figure 1. Epistaxis was observed in 107 trauma patients, accounting for 3.7% of the trauma cohort. The mean age of the overall epistaxis cohort was 42.9 years (SD: 16.49), with a predominance of male patients (*n*: 143; 76.1%) as indicated in Table 1.

The majority of these patients (*n*: 156; 82.9%) were triaged as priority II, whereas a smaller portion were triaged as priority I (*n*: 20; 10.6%) or priority III (*n*: 12; 6.5%). Among the comorbidities observed, hypertension (*n*: 53; 28.2%), diabetes mellitus (*n*: 37; 19.7%), and reactive airway disease (*n*: 22; 11.7%) were the most common. A few patients (*n*: 5; 2.7%) were taking anticoagulants or antiplatelet medications due to underlying medical conditions, and three patients were diagnosed with intranasal tumors at the

Table 1: Baseline characteristics and vital signs at presentation

Variables	Frequency (%)
Age (SD) ^a years	42.9 (16.49)
Sex ratio	
Female	45 (23.9)
Male	143 (76.1)
Triage priority levels	
Priority 1	20 (10.6)
Priority 2	156 (82.9)
Priority 3	12 (6.5)
Comorbidities	
Hypertension	53 (28.2)
Diabetes mellitus	37 (19.7)
Reactive airway disease	22 (11.7)
On oral anticoagulants or antiplatelet drugs	5 (2.7)
Ischemic heart diseases	4 (2.1)
Immunosuppression	4 (2.1)
Tumors	3 (1.6)
Cerebrovascular accident	2 (1.1)
Primary medical care received elsewhere	
No	169 (89.9)
Yes	19 (10.1)
Vital signs at presentation	
Pulse rate: Median (IQR) ^b	92.0 (84-100)
Systolic blood pressure <90 mmHg (frequency %)	7 (3.7%)
Respiratory rate: Median (IQR) ^b	22.98 (21.5-24.0)
O ₂ saturation level <94% in room air (frequency %)	8 (4.3%)

SD=Standard Deviation, IQR^b

time of their initial assessment. Approximately 10.1% of the patients had sought primary medical care prior to their visit to our facility. Furthermore, details on baseline characteristics and vital signs at presentation can be found in Table 1.

Figure 2 provides an overview of the likely etiologies of epistaxis, with trauma-related cases (*n*: 107; 56.9%) being the most frequent, as expected. Other common causes include hypertension (*n*: 29; 15.4%), mucosal irritation (*n*: 9; 4.8%), inflammatory disease (*n*: 7; 3.7%), and bleeding dyscrasias (*n*: 7; 3.7%). The cause of epistaxis could not be determined in 15 cases (8.0%).

Each patient was thoroughly examined, assessed, and managed by our ER team. In cases where bleeding could not be controlled, consultation with the ENT team was sought. Anterior nasal packing was performed for 85 (45.2%), patients, posterior nasal packing for one patient (0.5%), and the majority (*n*: 102; 54.3%) experienced spontaneous resolution of bleeding. All patients were closely monitored in the ER for a minimum of 4 hours. Upon successful control of bleeding, nasal packs were removed, and patients were discharged with medications and instructions to follow up at the ENT outpatient department (OPD). Nasal packs were retained for patients with uncontrolled nasal bleeding who required admission under the ENT department for further observation and intravenous antibiotics to prevent toxic shock syndrome. Among the 188 patients, seven (3.7%) experienced recurrent epistaxis. Of these cases, three (1.6%) required urgent

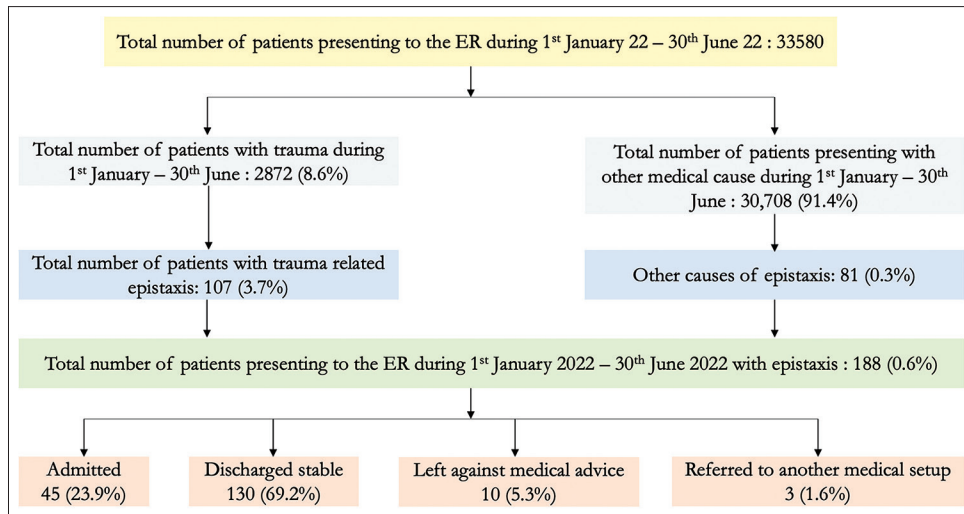


Figure 1: Reporting of Observational Studies in Epidemiology (STROBE) diagram

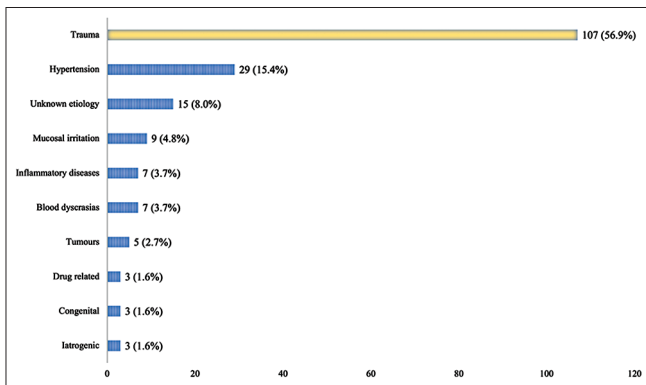


Figure 2: Likely etiology of epistaxis presenting to ER during the study period

resuscitation with crystalloid fluids and blood products. Two patients had bleeding dyscrasias, four had a history of trauma, and one patient presented with uncontrolled hypertension. Additionally, two patients (1.1%) returned to the ER with recurrent bleeding within 12 hours of discharge. Please refer to Table 2 for specific details and the accompanying statistical analysis.

Discussion

In our analysis, we observed a higher prevalence of epistaxis among young adults, which differs from the findings reported by Pallin DJ *et al.*^[1] They documented a bimodal age-related pattern with peaks occurring in individuals younger than 10 years and those aged 70-79 years. It is important to note that our study focused exclusively on patients aged 18 years and above, which could explain the disparity in age-related frequencies between our findings and those of Pallin DJ *et al.*^[1] However, our findings were consistent with the studies conducted by Akinpelu OV *et al.* and Varshney S *et al.*^[7,12] Several studies have reported a higher incidence of epistaxis in men compared to women, and our study also confirmed

Table 2: Details of recurrent epistaxis and chances of re-bleeding within 12 h of discharge from Emergency room

Variables	Frequency (%)	p-value
Recurrent epistaxis in ER (total)	7 (3.7)	0.001
Recurrent epistaxis in ER due to bleeding dyscrasias	2 (1.1)	-
Recurrent epistaxis in ER due to trauma	4 (2.2)	-
Recurrent epistaxis in ER due to uncontrolled hypertension	1 (0.6)	-
Hypovolemic shock	3 (1.6)	-
Rebled within 12 h	2 (1.1)	-
Male	2 (1.1)	1.00
Primary care received elsewhere	1 (0.6)	0.19
Primary care not received elsewhere	1 (0.6)	-
Triage priority level II	2 (1.1)	1.00
Diabetes mellitus	2 (1.1)	1.00
Hypertension	2 (1.1)	1.00

ER*=Emergency room

this observation with a substantial two-thirds predominance of males.^[7,9,12] The higher prevalence of traumatic epistaxis in young males can be attributed to their greater involvement in high-risk behaviors, such as trauma, road traffic accidents, fights, and injuries to the maxillofacial region.^[1,13] As young males are the most active demographic group, they are more susceptible to these types of incidents, leading to a skewed sex ratio and age distribution in our study. Hypertension emerged as the second most common cause in our study, highlighting epistaxis as an indicator of inadequate blood pressure management. This finding aligns with the available literature on epistaxis from India and other countries, where uncontrolled hypertension often stems from noncompliance with medication therapy.^[12,14-16] A 2017 systematic review and meta-analysis revealed a significant association between hypertension and increased risk of epistaxis among ER and hospitalized patients, although a causal link could not be established.^[17] Some authors have proposed that chronic uncontrolled hypertension increases pressure on blood vessel walls, rendering them more fragile and susceptible to bleeding.^[16,18,19]

Epistaxis treatment must be systematic and methodical, and options change depending on the cause, origin, location, and degree of the hemorrhage.^[8] Revivifying the patient, identifying the bleeding site, stopping the bleeding, and treating the underlying cause of the epistaxis are the four main steps in managing epistaxis.^[8] However, their results have never been assessed in our country, in part due to the dearth of local data. Treatment modalities can be broadly categorized into two groups: nonsurgical or conservative approaches and surgical methods. In more than 80–90% of cases, a nonsurgical approach has been reported to stop the bleeding.^[7-9]

In our cohort, the most commonly employed treatment modality was anterior nasal packing using gauzed glove finger packing. This approach has been widely described in the literature, although the specific materials used for packing may vary across different centers.^[7-9,12] Only one patient, who had hypertension as a primary condition, underwent posterior nasal packing. Potential complications associated with nasal packing include toxic shock syndrome, sinusitis, syncope during pack insertion, pressure necrosis of the alae nasi, and septal hematoma.^[9] However, with appropriate precautions in these patients, such as careful pack insertion technique, antibiotic prophylaxis, and nasal decongestant administration, the majority of our patients did not experience these complications during follow-up. In cases where patients had well-controlled hypertension with medication therapy, any spontaneous bleeding typically ceased with the subsequent administration of tranexamic acid. For patients with hypertensive urgency, tranexamic acid, in addition to oral or intravenous antihypertensive agents, was used to halt nasal bleeding by inhibiting fibrinolysis. Tranexamic acid is known for its antifibrinolytic effect, which helps reduce excessive bleeding and prevent rebleeding.^[20-22] Patients who presented with recurrent or uncontrolled nasal bleeding were admitted under the care of the ENT team for observation and, if necessary, minor surgical intervention. Those with hypovolemic shock received resuscitation with crystalloid solutions and blood products based on their hemodynamic status and were subsequently admitted to the intensive care unit. Only two patients (1.1%) in our study experienced rebleeding within 12 hours of being discharged from the ER. Both of these patients had underlying bleeding disorders as the likely cause of their epistaxis, but unfortunately, they left against medical advice before their bleeding disorders could be addressed. Upon re-examination, we noted that these patients underwent replacement of anterior nasal packing elsewhere after leaving our center.

The prevention of most underlying factors contributing to epistaxis is feasible. A comprehensive comprehension of the causes, treatments, and outcomes associated with these patients is essential for the development of preventive strategies and treatment recommendations. The results of this study will provide a fundamental basis for the formulation of treatment guidelines and the implementation of preventive measures within the emergency room setting and primary health care centers. Moreover, these findings will contribute to the existing body

of literature on epistaxis, enriching the available knowledge in this field.

Limitations of our study

It was not possible to eliminate referral bias as this study was conducted in a single facility. The stringent lockdown measures imposed during the COVID-19 pandemic hindered patients' ability to travel, thereby limiting our understanding of the true prevalence of epistaxis in this region. Additionally, a larger sample size would have provided more robust and comparable statistical outcomes. Furthermore, only patients who experienced re-bleeding within 12 hours were included in the study. Since a significant number of patients presented with bleeding after the 12-hour timeframe or were referred to other medical facilities, determining the exact cause of their condition remained challenging.

Conclusion

Epistaxis predominantly affected middle-aged to young males, with trauma being the primary cause of nosebleeds. Anterior nasal bleeding was the most frequently observed source, and effective hemostasis could be achieved through anterior nasal packing. Hypertension was identified as the second most common cause of epistaxis, which could be effectively managed using antihypertensive medications and tranexamic acid. The majority of these patients were triaged as priority II and were successfully discharged from the emergency room in a stable condition. However, it is important to acknowledge that this cohort also included patients with potentially life-threatening conditions, emphasizing the significance of considering the severity of cases encountered.

Key points

- Epistaxis, commonly caused by trauma or chronic uncontrolled hypertension, can be effectively managed in the emergency room or primary healthcare center with conservative care.
- Once spontaneous resolution of nose bleeding is achieved, patients should be recommended to follow up in a specialty clinic.
- Anterior nasal bleeding is the most common source, and effective hemostasis can be achieved through anterior nasal packing. Upon discharge, it is advisable to prescribe prophylactic antibiotics and nasal decongestants.

Ethical considerations

The authors of this publication declare that this scientific work follows the EQUATOR Network's reporting quality, formatting, and reproducibility requirements. The authors further state that this clinical study was initiated after approval from the Institutional Evaluation Board/Ethics Committee review, and that the protocol/approval number is (IRB Min nos: 14115 dated 07/07/2021). We also certify that the contents of this submission have not been plagiarized and that we have conducted a Plagiarism Check.

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Conflicts of interest

There are no conflicts of interest.

References

- Pallin DJ, Chng YM, McKay MP, Emond JA, Pelletier AJ, Camargo CA Jr. Epidemiology of epistaxis in US emergency departments, 1992 to 2001. *Ann Emerg Med* 2005;46:77-81.
- Reis LR, Correia F, Castelhana L, Escada P. Epidemiology of epistaxis in the emergency department of a southern European tertiary care hospital. *Acta Otorrinolaringol Esp (Engl Ed)* 2018;69:331-8.
- Bui R, Doan N, Chaaban MR. Epidemiologic and outcome analysis of epistaxis in a tertiary care center emergency department. *Am J Rhinol Allergy* 2020;34:100-7. doi: 10.1177/1945892419876740.
- Tabassom A, Cho JJ. Epistaxis. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; 2023 Available from: <http://www.ncbi.nlm.nih.gov/books/NBK435997/>. [Last accessed on 2023 Apr 17].
- Janzen VD. Rhinological disorders in the elderly. *J Otolaryngol* 1986;15:228-30.
- Yüksel A, Kurtaran H, Kankiliç ES, Ark N, Uğur KS, Gündüz M. Epistaxis in geriatric patients. *Turk J Med Sci* 2014;44:133-6.
- Akinpelu OV, Amusa YB, Eziyi JA, Nwawolo CC. A retrospective analysis of aetiology and management of epistaxis in a south-western Nigerian teaching hospital. *West Afr J Med* 2009;28:165-8.
- Pond F, Sizeland A. Epistaxis. Strategies for management. *Aust Fam Physician* 2000;29:933-8.
- Gilyoma JM, Chalya PL. Etiological profile and treatment outcome of epistaxis at a tertiary care hospital in Northwestern Tanzania: A prospective review of 104 cases. *BMC Ear Nose Throat Disord* 2011;11:8.
- Beck R, Sorge M, Schneider A, Dietz A. Current approaches to epistaxis treatment in primary and secondary care. *Dtsch Arztebl Int* 2018;115:12-22. doi: 10.3238/arztebl.2018.0012.
- Yan T, Goldman RD. Recurrent epistaxis in children. *Can Fam Physician* 2021;67:427-9.
- Varshney S, Saxena RK. Epistaxis: A retrospective clinical study. *Indian J Otolaryngol Head Neck Surg* 2005;57:125-9.
- Halewyck S, Depuydt C, Michel O. Severe traumatic epistaxis. *B-ENT* 2016;12(Suppl 26):29-38.
- Bereda G. Hypertensive urgency and anterior epistaxis caused by antihypertensive medication noncompliance: A case report. *Open Access Emerg Med* 2023;15:47-51.
- Charles R, Corrigan E. Epistaxis and hypertension. *Postgrad Med J* 1977;53:260-1.
- Sarhan NA, Algarni AM. Relationship between epistaxis and hypertension: A cause and effect or coincidence?. *J Saudi Heart Assoc* 2015;27:79-84.
- Min HJ, Kang H, Choi GJ, Kim KS. Association between hypertension and epistaxis: Systematic review and meta-analysis. *Otolaryngol Head Neck Surg* 2017;157:921-7.
- Byun H, Chung JH, Lee SH, Ryu J, Kim C, Shin JH. Association of hypertension with the risk and severity of epistaxis. *JAMA Otolaryngol Head Neck Surg* 2020;147:1-7.
- Nemes Z, Dietz R, Mann JF, Lüth JB, Gross F. Vasoconstriction and increased blood pressure in the development of accelerated vascular disease. *Virchows Arch A Pathol Anat Histol* 1980;386:161-73.
- Fox H, Hunter F. BET 1: Intravenous tranexamic acid in the treatment of acute epistaxis. *Emerg Med J* 2015;32:969-70.
- Joseph J, Martinez-Devesa P, Bellorini J, Burton MJ. Tranexamic acid for patients with nasal haemorrhage (epistaxis). *Cochrane Database Syst Rev* 2018;12:CD004328.
- Ockerman A, Vanassche T, Garip M, Vandenbrielle C, Engelen MM, Martens J, *et al.* Tranexamic acid for the prevention and treatment of bleeding in surgery, trauma and bleeding disorders: A narrative review. *Thromb J* 2021;19:54.