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ORIGINAL RESEARCH

Etiopathological evaluation of epistaxis and management

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ABSTRACT

Background- Epistaxis is the medical term for internal bleeding from the nose or nasal cavity.There is concerning lack of knowledge about first-aid management for epistaxis in the general population. This study "Etiopathological Evaluation of Epistaxis and Its Management" aims to bridge these knowledge gaps and contribute to better management practices. **Methods-** This is a prospective cross sectional observational study carried out in the department of OTORHINOLARYNGNOLOGY, F.H Medical College and Hospital, Etmadpur, Agra. The required sample size for the present study was 167. All eligible patients, reporting to the department and meeting inclusion criteria were selected. Informed written consent from all the eligible patient was taken. **Results-** Epistaxis occurrences were most common at night (38.92%), followed by the evening (34.73%) and the morning (26.35%).Winter saw the highest incidence (41.92%), followed by summer (29.34%), autumn (16.17%), and spring (12.57%). 24.55% of patients had a history of hypertension (HTN), 5.99% were on medications with hemorrhagic risks, and 2.40% had experienced epistaxis within the last 6 months. Trauma (28.14%) was the leading cause, followed by cardiovascular-related issues such as hypertension and atherosclerosis (24.55%). Other causes included idiopathic (12.57%), inflammatory diseases (12.57%), and foreign bodies (8.38%).Most patients (89.22%) received nonsurgical treatments. Cauterization (52.69%) was the most common, followed by anterior nasal packing (26.34%). and observation with topical vasoconstrictors (6.59%).Surgical treatments (10.77%) included excision of bleeding mass (2.40%) and endoscopic SPA ligation (2.40%). **Conclusion-** The etiopathology of epistaxis is multifactorial, with a complex interaction between age, gender, environmental factors, and underlying medical conditions. Management strategies should be tailored to the specific cause and severity of bleeding, while preventive measures for known risk factors (such as trauma and hypertension) can help reduce recurrence. The study highlights that epistaxis is predominantly managed with non-invasive treatments, with surgical interventions reserved for more severe cases.

INTRODUCTION

Epistaxis, or bleeding from the inside of the nose or nasal cavity, is one of the most common emergencies encountered in otorhinolaryngology worldwide, frequently necessitating hospital admission. While its exact incidence is difficult to determine, it is estimated that around 60% of the population will experience epistaxis at some point in their lives, with 6% requiring medical intervention.[1] Epistaxis primarily occurs in children aged 2 to 10 years and in older adults between 45 and 65 years. Many cases are spontaneous and resolve on their own, often needing only basic first aid. However, it's crucial to identify the signs and symptoms that may indicate more serious underlying conditions.[2]

Epistaxis can be classified into anterior and posterior types based on the site of origin.[3] Anterior epistaxis is more common than posterior and typically originates from Kiesselbach's plexus, a dense network of vascular anastomoses formed by end arteries, or from the retrocolumellar vein.[4] As the bleeding site is easily accessible, anterior epistaxis, which frequently affects children and young adults, is rarely severe. In contrast, posterior epistaxis arises from the area supplied by the sphenopalatine artery (SPA) in the posterior nasal cavity, commonly affecting elderly individuals. Posterior epistaxis often presents with profuse bleeding, and due to the challenging location of the bleeding site, it poses greater difficulties in management.[5] while anterior epistaxis is usually managed with local pressure or anterior nasal packing, posterior epistaxis often requires more intensive interventions, such as posterior nasal packing or arterial ligation.

The causes of epistaxis can be categorized into systemic and local factors. Local causes include

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inflammation, infections, trauma, anatomical abnormalities such as a deviated nasal septum or septal spur, chemical or climatic changes, neoplasms, and foreign bodies.[6] Systemic causes include hematologic disorders leading to coagulopathies, cardiovascular conditions such as hypertension and vascular heart disease, liver or kidney disease, and the use of anticoagulant medications. However, in 80–90% of cases, no specific cause is identified, and the condition is classified as "idiopathic".[7] Factors such as habitual nose blowing, excessive coughing in chronic obstructive pulmonary disease (COPD), straining due to constipation or benign prostatic hyperplasia (BPH), and lifting heavy objects can exacerbate epistaxis.[8]

The management of adult epistaxis follows a stepwise approach, starting with stabilizing the patient's airway, controlling bleeding, and examining the nasal cavity. Initial first aid involves pinching the nose and leaning forward to prevent blood ingestion.[9]The patient should be assessed in a semi-recumbent position, with healthcare providers wearing protective gear due to the risk of blood aerosol contamination during nasal packing. Standard equipment includes a recliner, headlamp, suction, vasoconstrictor solutions like lignocaine and pseudoephedrine, nasal packs, and cautery tools. Specialized ENT units should also have bipolar electro diathermy and endoscopic tools.[10]

Indirect therapies such as topical haemostatic agents, tranexamic acid, nasal packing, and endoscopic intervention are commonly used. If these measures are insufficient, surgical options are pursued. Endoscopic sphenopalatine artery ligation (ESPAL) involves locating and ligating the artery behind the middle turbinate.[11] For internal maxillary artery ligation, the Caldwell or endoscopic approach can be used to expose and ligate the artery in the maxillary sinus.

In cases where the external carotid artery (ECA) requires ligation, a vertical incision near the sternocleidomastoid is made to access the artery.[12]If epistaxis is associated with a deviated septum, septal surgery such as septoplasty or submucosal resection (SMR) may be necessary. Septal surgery helps stop the bleeding by cutting off the blood supply to the septum.[13]

AIMS AND OBJECTIVES

The present study was carried out with following aims and objectives.

- To evaluate etiological factors of epistaxis
- To evaluate Treatment of epistaxis
- To assess gender, age and site wise distribution of etiological factors and treatment of epistaxis.

MATERIAL AND METHODS

Study Design: This was a prospective cross sectional observational study.

Study Setting: The current study was conducted in the Department of Otorhinolaryngology at F. H. Medical College, Agra (UP).

Study Duration: The study was carried out over a period of 12 months from August 2023 to August2024.

Sample Size: The required sample size for the present study was 167.

Sample Size Calculation

Sample size estimation was done by using nMaster2.0 (CMC, Vellore. Minimum sample size of 167 was found to be sufficient for confidence level of 95% and precision of 5%.

Hypothesis Testing for Single Proportion

Population Proportion: 0.0014
Sample Proportion: 0.015
Power (1- beta) %: 80
Alpha error (%): 5
1 or 2 sided: 2
Required sample size: 167

Ethical Consideration

After obtaining approval from the Ethical Committee and parental consent, patients with epistaxis were included in the study. They were informed about the study's purpose and reassured regarding the safety of the management procedures during the consent collection process. They were also made aware that they had the option to decline or withdraw their consent at any time, including after the data collection phase.

INCLUSION CRITERIA

- Inclusion criteria were all age groups of both sexes presenting with epistaxis
- Patients who will be willing to give informed, written, valid consent.

EXCLUSION CRITERIA

- Patients having epistaxis from recent septal or paranasal sinus surgery.

METHODS

As soon as the patient presented to the hospital, priority was given to arresting the bleeding and improving the patient's general condition. Suction of the nasal cavity was performed to localize the site of bleeding. When the bleeding was from Little's area, the site was cauterized with 15% silver nitrate or 15% trichloroacetic acid (TCA). The initial assessment included evaluating the hemodynamic status, type, and severity of the bleeding.

Once the bleeding was controlled, a detailed clinical history and examination were carried out according to the prepared proforma. In cases of mild bleeding with a stable patient, history details were noted. In cases of heavy bleeding, history was taken after the bleeding was controlled. If there were signs of excessive blood

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loss and/or the patient was in a state of shock, steps were taken to stabilize the patient simultaneously with controlling the epistaxis.

When the site could not be localized and the patient presented with anterior epistaxis, anterior nasal packing was performed using soframycin ribbon gauze or Merocel packs. In cases of continued bleeding or posterior epistaxis, post- nasal packing was done using a post-nasal pack or Foley's catheter under general anesthesia (GA). Blood samples were taken and sent for baseline hemoglobin estimation, blood grouping, and cross-matching when indicated. Other relevant investigations were ordered based on clinical suspicion regarding a particular etiology.

The diagnosis of epistaxis was based on clinical history, physical findings, laboratory and radiological investigations, and endoscopic examination under anesthesia of the nose, nasopharynx, and biopsy. All patients were treated conservatively initially, and surgical intervention was considered only when conservative measures failed to control the epistaxis. Data were collected using a pre-tested, structured proforma prepared for this purpose, which included patient demographics, cause of epistaxis, anatomical location of bleeding sites, management modalities, need for blood transfusion, complications, and mortality.

Routine investigations included a complete hemogram, bleeding time, clotting time, absolute eosinophil count, erythrocyte sedimentation rate, urine analysis, blood grouping, and Rh typing. Specific investigations, as required, included prothrombin time, electrocardiogram, X-ray of nasal bones, paranasal sinuses, and nasopharynx, CT scan of the nose and paranasal sinuses, and biopsy with histopathological examination of the biopsy specimen. Once the etiology was established, the patient received definitive treatment, which included controlling infections with medical measures, removal of foreign bodies, control of hypertension, fresh blood or platelet transfusions, and reduction of the bleeding vessel. After discharge, the first follow-up occurred after 15 days.

STATISTICAL ANALYSIS

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 21, IBM Inc. Descriptive statistics were reported for each variable, and summarized data were presented using tables and graphs. Data normality was assessed to determine the use of parametric or non-parametric tests. A p-value of <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

Table-1: Distribution according to age.

Age in years	No. of cases	%
18-30	44	26.35%
31-40	33	19.76%
41-50	28	16.77%
51-60	23	13.77%
61-70	17	10.18%
71-80	20	11.98%
81-90	2	1.20%
Mean ± SD	35.44 ± 2.15	

The above table showed that the highest number of cases in the 18-30 age range (26.35%). The mean age was 35.44 years, with a standard deviation of 2.15 years, indicating that most individuals were clustered around this average age. The number of cases decreased with age, with the lowest number in the 81-90 age group (1.20%).

Table-2: Distribution according to gender.

Gender	No. of cases	%
Female	102	61.08%
Male	65	38.92%

The above table showed that the gender 61.68% of the cases being female and 38.92% being male.

Table-3: Distribution according to site of involvement.

Site of involvement	No. of cases	%
Left	80	47.90%
Right	60	35.93%
Bilateral	27	16.17%

The above table showed that the 47.90% affecting the left side, 35.93% affecting the right side, and 16.17% involving both sides. This indicated a higher frequency of left-sided involvement compared to right and bilateral cases.

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Table-4: Distribution according to circadian rhythm.

Circadian rhythm	No. of cases	%
Morning	44	26.35%
Evening	58	34.73%
Night	65	38.92%

The above table showed that the 38.92% occurring at night, 34.73% in the evening, and 26.35% in the morning.

Table-5: Distribution according to season.

Season	No. of cases	%
Spring	21	12.57%
Summer	49	29.34%
Autumn	27	16.17%
Winter	70	41.92%

The above table showed that the 41.92% occurring in winter, 29.34% in summer, 16.17% in autumn, and 12.57% in spring.

Table-6: Distribution according to previous history.

Previous history	No. of cases	%
HTN	41	24.55%
Medications with a hemorrhagic risk currently or stopped within the last 10 days	10	5.99%
Epistaxis in Prev 6 months	4	2.40%

The above table showed that the 24.55% having a history of hypertension (HTN), 5.99% taking medications with a hemorrhagic risk either currently or stopped within the last 10 days, and 2.40% having experienced epistaxis in the previous 6 months.

Table-7: Distribution according to alcohol intake.

Alcohol intake	No. of cases	%
Non-drinkers (never drinks)	104	62.28%
Occasional drinkers (<once a week)	46	27.54%
Regular drinkers (> once a week)	17	10.18%

The above table showed that the 62.28% being non-drinkers (never having consumed alcohol), 27.54% being occasional drinkers (less than once a week), and 10.18% being regular drinkers (more than once a week).

Table-8: Distribution according to causes.

Causes	No. of cases	%
Trauma	47	28.14 %
Cardiovascular related (Hypertension+ atherosclerosis)	41	24.55 %
Idiopathic	21	12.57 %
Inflammatory diseases (chronic rhinosinusitis)	21	12.57 %
Foreign bodies (living / non-living)	14	8.38%
Tumors(benign/malignant)	7	4.19%
Blood dyscrasia (including liver diseases)	2	1.20%
Coagulopathy	10	5.99%
Infection	4	2.40%

The above table showed that the distribution of causes for the cases, with trauma (including injury and surgery) being the most common cause at 28.14%, followed by cardiovascular-related issues (hypertension and atherosclerosis) at 24.55%. Other causes included idiopathic factors and inflammatory diseases, both at 12.57%, while foreign bodies accounted for 8.38%. Tumors, blood dyscrasia, coagulopathy, and infections were less frequent causes, representing 4.19%, 1.20%, 5.99%, and 2.40%, respectively.

Table-9: Distribution according to treatment modality.

Treatment modality	No. of cases	%
Non-surgical treatment	**149**	**89.22%**
Observation with topicalvasoconstrictor only	11	6.59%
Cauterization	88	52.69%
Anterior nasal packing	44	26.34%
Posterior nasal packing	6	3.59%
Surgical treatment-	**18**	**10.77%**

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Endoscopic SPA ligation	4	2.40%
Excision of bleeding mass	4	2.40%
Septoplasty	2	1.20%
Other surgeries	8	4.79%

The above table showed that the treatment modalities used for the cases, with 89.22% receiving nonsurgical treatment. Among these, cauterization was the most common at 52.69%, followed by anterior nasal packing (26.34%) and observation with topical vasoconstrictors (6.59%).Surgical treatments accounted for 10.77% of cases, with endoscopic SPA ligation (2.40%), excision of a bleeding mass (2.40%), septoplasty (1.20%), and various other surgeries (4.79%).

DISCUSSION

Distribution according to age

Most cases were in the younger age groups, with the highest number in the 18– 30 years range, followed by a gradual decline in older age groups. The lowest number of cases is seen in those aged 81–90 years. The average age of the cases is 35.44 ± 2.15 years, suggesting that the study population is mostly young to middle-aged. The study by **Muniraju M et al.[14] (2023)** reveals that the highest prevalence of epistaxis occurred in the 10-19 years age group, representing 21.67% of the total cases, followed by the 20-29 years group at 16.67%. Cases were also observed in the 0-9 years and 30-39 years age groups, each with 10% of cases, while the 40-49 years group accounted for 16.67%. The frequency of epistaxis significantly decreased in the older age groups, with 8.33% in the 50- 59 years group and 11.67% in the 60-69 years group. The elderly population, particularly those aged 70-79 years, showed minimal representation, with only one case, and no cases were recorded in individuals aged 80 years and above. This indicates a decreasing trend in the prevalence of epistaxis with advancing age.

Distribution according to gender

In this study, a higher number of cases of epistaxis were observed in females, who accounted for 61.08% of the total cases, compared to males, who represented 38.92%. This indicates that epistaxis is more common in females than in males, based on the data collected. The findings suggest a gender-based difference in the prevalence of the condition, with females being more frequently affected.In the study by **Rao et al.[15] (2018)**, the distribution of cases according to gender showed that males were more commonly affected, accounting for 66% of the total cases, while females represented 34%. This indicates a higher prevalence of the condition among males compared to females in the study population.

Distribution according to site of involvement

In this study, most cases affected the left side, making up 47.90% of the total. The right side was involved in 35.93% of the cases. Bilateral involvement, where both sides were affected, was seen in 16.17% of the cases. This indicates that left-sided involvement is more common than right-sided or bilateral involvement in the epistaxis. **Ukawat L, et al.[1] (2024)** The distribution of epistaxis cases based on the side of bleeding revealed that bilateral bleeding was the most common, accounting for 46.3% of cases, with 102 male and 39 female patients affected. Right-sided bleeding was the second most frequent, occurring in 44.4% of cases, with 87 male and 48 female patients. Left-sided bleeding was less common, making up 9.2% of the cases, with 21 male and 7 female patients. These findings suggest that bilateral epistaxis is the predominant pattern, followed by right-sided bleeding, while left-sided bleeding is relatively rare.

Distribution according to circadian rhythm

The distribution of epistaxis cases based on circadian rhythm shows that the majority occurred at night, accounting for 38.92% of the total cases. This suggests that epistaxis may be more prevalent or noticeable during the night, possibly due to factors such as changes in environmental conditions, body posture, or nasal congestion that worsen at night. The second most common time for epistaxis was in the evening, with 34.73%, indicating that the condition is still fairly common during the later part of the day, potentially linked to daily activities or dehydration. The morning had the fewest cases, with 26.35%, suggesting that epistaxis is less likely to occur during the early hours, possibly due to the body being more hydrated or less physically active at that time. Overall, the pattern indicates a higher frequency of epistaxis at night, a moderate occurrence in the evening, and the lowest frequency in the morning.

Distribution according to season

The distribution of epistaxis cases across different seasons shows the highest number occurring in winter, accounting for 41.92%, followed by summer with 29.34%, autumn with 16.17%, and spring with 12.57%. This suggests that epistaxis is most common in the winter season and least common in spring. **Ruhela S et al.[16] (2023)** in their study indicate that epistaxis cases were most prevalent during the winter season (42.31%), followed by the rainy season (19.23%), autumn (13.46%), spring (14.42%), and summer (10.58%). The higher incidence in winter may be due to dry and cold weather conditions, which contribute to nasal mucosal dryness and increased fragility, making individuals more prone to epistaxis.

Distribution according to previous history

Among the cases, 24.55% had a previous history of

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hypertension (HTN), 5.99% were on medications with a haemorrhagic risk either currently or stopped within the last 10 days, and 2.40% had a history of epistaxis in the previous 6 months. This indicates that a significant portion of cases with epistaxis had hypertension, while a smaller number had a history of recent medication use with bleeding risks or recent epistaxis.

Distribution according to alcohol intake

The majority of cases were non-drinkers, accounting for 62.28%, followed by occasional drinkers who consumed alcohol less than once a week (27.54%), and regular drinkers who consumed alcohol more than once a week (10.18%). This suggests that most individuals with epistaxis do not drink alcohol regularly, with fewer cases among occasional or regular drinkers. **Li HY et al.[17] (2023)** found that smoking and drinking did not show statistically significant associations with epistaxis. The p-values for smoking (0.742) and drinking (0.831) were both higher than the conventional threshold of 0.05, suggesting there is no strong evidence to support their impact on the risk of epistaxis.

Distribution according to causes

The most common cause of epistaxis was trauma, including both injury and surgery, accounting for 28.14% of cases, followed by cardiovascular-related causes such as hypertension and atherosclerosis (24.55%). Other notable causes included idiopathic origins and inflammatory diseases like chronic rhino sinusitis (both 12.57%), foreign bodies (8.38%), and coagulopathy (5.99%). Tumours, blood dyscrasia, and infections were less frequently observed, with tumours accounting for 4.19%, blood dyscrasia for 1.20%, and infections for 2.40%. This distribution highlights trauma and cardiovascular issues as the leading causes of epistaxis in the study population. **Parajuli R et al.[3] (2015)** found that the exact cause of epistaxis could not be determined in 38.09% of the cases, which were categorized as idiopathic. The most common identifiable cause was hypertension, accounting for 27.38% of the cases, followed by trauma, which contributed to 15.47% of the cases. Coagulopathy was observed in 8.33% of the patients. This indicates that while a significant proportion of cases had no identifiable cause, hypertension and trauma were the leading causes of epistaxis in the study population.

Distribution according to treatment modality

The majority of cases were managed with nonsurgical treatments, accounting for 89.22%, with cauterization being the most common approach (52.69%). Other nonsurgical treatments included observation with a topical vasoconstrictor (6.59%) and anterior nasal packing (26.34%). Surgical treatments were used in 10.77% of cases, with endoscopic SPA ligation (2.40%), and excision of bleeding mass (2.40%), septoplasty (1.20%), and other surgeries (4.79%) being employed. This highlights that most cases were treated conservatively, while a smaller proportion required surgical interventions. **Muniraju M et al.[14] (2023)** categorized the treatment of epistaxis into non-surgical/non-interventional and surgical/interventional approaches. Non- surgical treatments were more commonly used, accounting for 55% of the cases. The most frequent non-surgical treatments included anterior nasal packing alone (15%), DNE followed by chemical cauterization (18.33%), and foreign body removal (6.67%). Other non-surgical options, such as electro cauterization, observation, and topical nose drops or blood transfusion, were less frequently employed. Surgical treatments, which made up 45% of the cases, included endoscopic excision of masses (15%), septoplasty (8.33%), and fracture nasal bone correction (13.33%). These findings highlight a predominant reliance on non-surgical management, with surgical intervention reserved for more specific or severe cases. **Uma N et al. (2022)[18]** categorized the treatments for epistaxis into various approaches, with conservative management being the most common, accounting for 43% of the cases. Other significant treatments included anterior nasal packing (27%), endoscopic excision with electrical cauterization (6%), and endoscopic excision with anterior nasal packing (9%). Nasal bone fracture reduction was performed in 9% of cases, and chemical cauterization was used in 2%. A small proportion of patients required removal under general anaesthesia (1%), and combined anterior and posterior nasal packing was used in 3% of cases. These findings suggest that conservative treatments and nasal packing are the most frequently employed methods, with more invasive approaches used for specific conditions.

CONCLUSION

This study aimed to evaluate the etiological factors contributing to epistaxis, focusing on identifying common causes and risk factors. Additionally, it sought to assess the treatment approaches used for managing epistaxis, evaluating their effectiveness and safety. Furthermore, the study explored the distribution of etiological factors and treatment strategies based on gender, age, and the site of bleeding, providing a comprehensive understanding of how these variables influenced both the causes and management of epistaxis. Patients should be advised to use saline sprays or irrigation to maintain nasal hygiene following an episode of acute epistaxis. It is beneficial to educate them on proper first aid measures for recurrence, such as sitting upright while applying digital pressure to the cartilaginous part of the nose, using ice packs around the neck, and sucking on ice. Patients should also be encouraged to avoid activities that could provoke bleeding, including nose blowing, picking, heavy lifting, and strenuous exercise. They should refrain from consuming alcohol and hot drinks that can cause vasodilation of the nasal

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vessels. Additionally, topical gels, lotions, and ointments or paraffin can be recommended to moisturize the mucosa and support healing. This analysis helped tailor more targeted prevention and treatment strategies for different demographic groups. Overall, the study highlights that epistaxis is predominantly managed with non-invasive treatments, with surgical interventions reserved for more severe cases.

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