

## Original Article

# Clinical and Laboratory Profile of Patients with Epistaxis in Kano, Nigeria: A 10-year Retrospective Review

A Ajiya, A Adamu, IY Shuaibu<sup>1</sup>

Department of Otorhinolaryngology, Faculty of Clinical Sciences, College of Health Sciences, Aminu Kano Teaching Hospital / Bayero University, Kano, <sup>1</sup>Division of Otorhinolaryngology, Department of Surgery, Faculty of Clinical Sciences, College of Medical Sciences, Ahmadu Bello University, Zaria, Nigeria

**Received:**  
07-Nov-2019;  
**Revision:**  
06-Jan-2020;  
**Accepted:**  
20-May-2020;  
**Published:**  
12-Aug-2020

### ABSTRACT

**Background:** Epistaxis is a common cause of otorhinolaryngological clinic visits and admissions into accident and emergency. Severe epistaxis could remarkably alter the hemodynamic milieu of individuals and results into significant morbidity and occasional mortality. **Aims:** To review the clinical pattern and laboratory test results of individuals treated for epistaxis in a tertiary health care center in northern Nigeria. **Methods:** This study was a 10-year retrospective review of patients managed for epistaxis in the department of otorhinolaryngology, Aminu Kano teaching hospital, Kano, Nigeria. Case files of patients were retrieved, reviewed, and clinical and laboratory data were extracted. The data were analyzed using Statistical Product and Service Solution version 23. **Results:** A total of 256 were reviewed with 149 (58.2%) male and 107 (41.8%) female with M: F of 1.4:1. A mean age  $\pm$  SD of  $33.86 \pm 20.06$  years. Anterior epistaxis was the most prevalent, 126 (49.2%), and majority of the patients presented with severe epistaxis, 75 (29.3%). Most were treated with nasal packing, 93 (36.3%). Majority had abnormal full blood counts and clotting profile results, 158 (61.75) and 104 (40.6%), respectively. There was a significant association between patient's genotype and outcome. Anterior epistaxis and AA genotype were significant positive predictors of outcome. **Conclusion:** Coagulopathies, anaemia, and hemoglobinopathies are common findings among our patients with epistaxis.

**KEYWORDS:** *Clinical pattern, epistaxis, laboratory test results, outcome*

## INTRODUCTION

Epistaxis is a common cause of visits to the emergency units of most hospitals worldwide.<sup>[1,2]</sup> Presentation of nose bleeding is common among most individuals, as it is being reported to occur in 60% of individuals worldwide during their lifetime with only 6% coming for medical treatment.<sup>[3]</sup> In Europe and North America, the incidence of epistaxis is between 10% and 15% of the population.<sup>[4,5]</sup> The prevalence of epistaxis is increased between the age of 2 and 10 years and then above the age of 35 years exhibiting a bimodal distribution. Generally, males are slightly more affected than females, though equating with advancing age above 50 years.<sup>[6]</sup>

Epistaxis may present as a chronic problem of recurrent bleeds or may be a symptom of a generalized disorder. It

can be a source of significant anxiety in the emergency room greatly affecting the hemodynamic stability of the patients.<sup>[7]</sup>

The nasal mucosa is rich in blood supply, having rich anastomosis contributed upon by branches of both external and internal carotid arteries. Anteriorly is the Kiesselbach's plexus is responsible for anterior epistaxis, which is the most common (85-95%) site in most individuals and is easy to locate and treat. Posteriorly is the Woodruff's plexus where posterior epistaxis often occurs. It constitutes 5-15% and is often more severe, difficult to locate and treat.<sup>[8]</sup>

**Address for correspondence:** Dr. IY Shuaibu,

Division of Otorhinolaryngology, Department of Surgery, Ahmadu Bello University Zaria, Nigeria.  
E-mail: iyshuaibu@abu.edu.ng

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Ajiya A, Adamu A, Shuaibu IY. Clinical and laboratory profile of patients with epistaxis in Kano, Nigeria: A 10-year retrospective review. *Niger J Clin Pract* 2020;23:1135-40.

Access this article online	
<b>Quick Response Code:</b> 	<b>Website:</b> <a href="http://www.njcponline.com">www.njcponline.com</a>
	<b>DOI:</b> 10.4103/njcp.njcp_610_19

Idiopathic epistaxis has been reported in about 80-90% of cases; however, causes of epistaxis can be broadly divided into local or systemic.<sup>[5,9]</sup> The causes vary with age, and anatomical location. Trauma being most common in younger age group (under 35 years) and non-traumatic causes characterizing the profile in older patients (age over 50 years).<sup>[8,9]</sup>

The etiology and severity of epistaxis could impact the hemodynamic and blood chemistry picture of the patients; thus, blood tests are often requested for in these patients. This study, therefore, aim to review the clinical and blood test findings among patients with epistaxis in the study area.

## SUBJECTS AND METHODS

This was a retrospective descriptive study of patients managed for epistaxis at the department of otorhinolaryngology, Aminu Kano teaching hospital (AKTH), Kano Nigeria, over a 10 years period between January 2009 and December 2018. Ethical approval was sought and obtained from the ethical review committee of Aminu Kano teaching hospital, Kano, Nigeria.

All the patients included had clinical diagnosis of epistaxis and relevant laboratory blood investigations done. Part of the protocol for managing patients with epistaxis in our centre was to conduct laboratory investigations, including blood count, blood grouping, genotype, clotting profile, blood film picture, electrolytes on all patients. Patients that were excluded are those whose case records were either not found or did not have complete clinical or laboratory information. Patient's data and laboratory test results were collected from the case files.

Information obtained from the case files included demographic characteristics such as age, sex, and occupation. Clinical information included duration of epistaxis, frequency, severity, side, and site of epistaxis. Possible etiology, hemodynamic status, treatment modality, point of review, hospital stay, complications, and outcome of treatment were also documented. Laboratory investigations reviewed included full blood count, blood group, genotype, clotting profile, blood film picture, electrolytes, and liver function tests.

Data were entered into spreadsheet and analyzed using SPSS version 23 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were summarized as frequencies and percentages and presented as tables. Statistical relationships were analyzed using Pearson correlation test, Fishers exact tests and multiple logistic regression analysis. *P* value was set at less than 0.05.

## RESULTS

Within the period January 2009 to December 2018, a total of 278 patients were managed for epistaxis at the otorhinolaryngology department of Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria. Of this, 256 were found to satisfy the inclusion criteria having complete clinical and laboratory information and were included in the study. There were 149 (58.2%) male and 107 (41.8%) females with M: F ratio of 1.4:1. The age ranged from 4 years to 85 years, with a mean age  $\pm$  standard deviation of  $33.86 \pm 20.06$  years, and a median age of 31 years. The peak age of occurrence was in the age group 20-39 years. Students followed by civil servants were most affected with 74 (28.9%) and 61 (23.8%), respectively [Table 1].

Duration of nasal bleeding in 86 (33.6%) of the patients was less than 24 h, while up to 30 (11.7%) had intermittent bleeding for more than 7 days before hospital review. A total of 150 (58.6%) patients had previous episodes of nose bleeding before coming to the hospital and among them 50 (19.5%) had only 1 previous episode, 62 (24.2%) patients had up to 2 previous episodes, while 38 (14.8%) had 3 or more previous episodes. Anterior epistaxis was most prevalent among the patients 126 (49.2%); however, in 105 (41.0%) patients the site of bleeding could not be identified. Among 75 (29.3%) patients who presented with severe epistaxis, 46 (18.0%) had to be transfused with blood. At presentation, 72 (28.1%) patients had stable vital signs while 38 (14.8%) were in hypovolaemic shock. Left nasal bleeding was most common among the patients 118 (46.1%). 92 (35.9%) of the patients with epistaxis were first seen at the

**Table 1: Demography of patients with epistaxis (n=256)**

Variable	Number of patients	Percentages
Age group:		
0-19 yrs	65	25.4
20-39 yrs	104	40.6
40-59 yrs	50	19.5
60-79 yrs	30	11.7
80+	7	2.7
Gender:		
Male	149	58.2
Female	107	41.8
Occupation:		
C/servant	61	23.8
Farmer	42	16.4
Business	34	13.3
Unemployed	28	10.9
Student	74	28.9
Others	17	6.6

Mean age $\pm$ SD=33.9  $\pm$ 20.1 years, age range=4-85 years, Median age=31 years

**Table 2: Pattern of clinical presentations among patients with epistaxis**

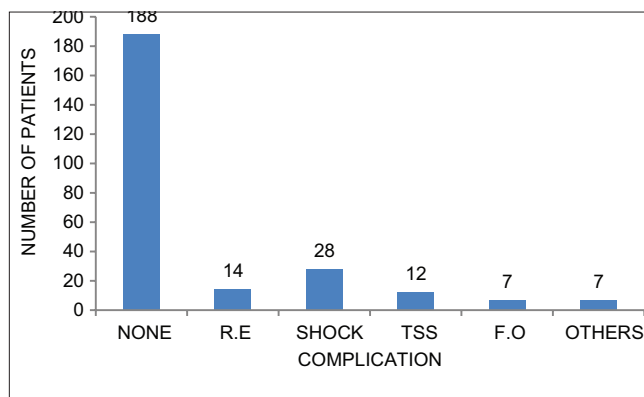
Variable	Number of patients	Percentages
Duration of bleeding:		
Less than 24 hours	86	33.6
1-3 days	60	23.4
4-7 days	80	31.3
More than 7 days	30	11.7
Previous episodes:		
Yes	150	58.6
No	106	41.4
Number of episodes:		
Nil	106	41.4
Once	50	19.5
Twice	62	24.2
Multiple	38	14.8
Site of bleeding:		
Anterior	126	49.2
Posterior	25	9.8
Not identified	105	41.0
Severity of bleeding:		
Mild	74	28.9
Moderate	61	23.8
Severe	75	29.3
Required transfusion	46	18.0
Hemodynamic status:		
Stable	72	28.1
Weak	146	57.0
In shock	38	14.8
Side of bleeding:		
Right	101	39.5
Left	118	46.1
Both	37	14.5
Point of review:		
Accident and emergency	92	35.9
Clinic	80	31.3
Ward	72	28.1
Others	12	4.7
Duration of hospital stay:		
Not admitted	86	33.6
1-3 days	60	23.4
4-7 days	80	31.3
More than 7 days	30	11.7

emergency unit and up to 170 (66.6%) were admitted into the ward with 80 (31.3%) staying for 4 to 7 days on admission [Table 2].

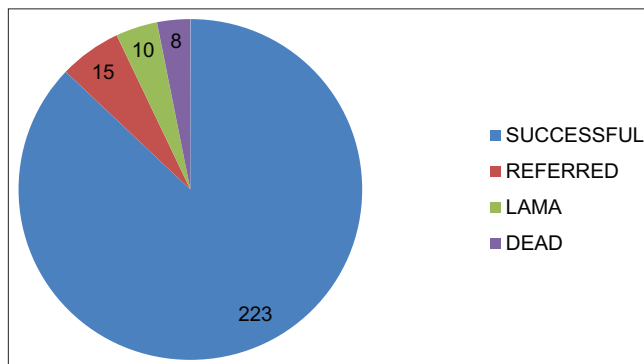
The major cause of epistaxis among the patients was trauma followed by infection 70 (27.3%) and 66 (25.8%), respectively. Upto 26 (37.1%) of the cases of trauma was due to nose picking. Combined anterior and posterior nasal packing was the modality of treatment for most of the patients 93 (36.3%) only 9 (3.5%) had surgical ligation of the vessels [Table 3].

**Table 3: Etiology and treatment modalities of patients with epistaxis**

Variable	Number of patients	Percentages
Causes:		
Trauma	70	27.3
Hypertension	27	10.5
Infection	66	25.8
Tumor	27	10.5
Bleeding disorders	7	2.7
Chronic kidney dx	8	3.1
Idiopathic	39	15.2
Others	12	4.7
Treatment modality:		
Nasal packing	167	65.2
Cauterization	52	20.3
Surgical ligation	9	3.5
Medical treatment	28	11.0



**Figure 1: Complications among patients with epistaxis. RE recurrent epistaxis, TSS toxic shock syndrome; FO facial oedema**



**Figure 2: Outcome of treatment in patients with epistaxis. LAMA leave against medical advice**

Majority 188 (73.4%) of the patients did not have any complication, however, the most common complication among the others is hypovolaemic shock 28 (10.9%) [Figure 1]. Most of the patients 223 (87.1%) were successfully treated, with only 8 deaths (3.1%). [Figure 2].

**Table 4: Laboratory test results of patients with epistaxis**

Variable	Number of patients	Percentages
Full blood counts:		
Normal	67	26.2
Abnormal	158	61.7
Not done	31	12.1
Blood group:		
A	51	19.9
B	23	9.0
AB	15	5.9
O	70	27.3
Not done	97	37.9
Rhesus:		
Positive	153	59.8
Negative	7	2.7
Not done	96	37.5
Genotype:		
AA	88	34.4
AS	17	6.6
SS	19	7.4
Not done	132	51.6
Clotting profile:		
Normal	64	25.0
Abnormal	104	40.6
Equivocal	26	10.2
Not done	62	24.2
Blood film:		
Normal	63	24.6
Abnormal	117	45.7
Not done	76	29.7
Electrolytes:		
Normal	105	41.0
Abnormal	120	46.9
Not done	31	12.1
Liver function test:		
Normal	94	36.7
Abnormal	74	28.9
Not done	88	34.4

Mean hemoglobin level in male=8.46g/dl. Mean hemoglobin level in female=7.86g/dl. Mean hemoglobin level in children (0-9 years)=7.63g/dl. Mean platelet level in male= $239.23 \times 10^9$ . Mean platelet level in female= $220.51 \times 10^9$ . Mean platelet level in children (0-9 years)= $198.08 \times 10^9$

Blood group O was most common accounting for 70 (27.3%), abnormal clotting profile, AA genotype, and abnormal full blood counts were in the majority 104 (40.6%), 88 (34.4%), and 158 (61.7%), respectively. The mean hemoglobin levels among male, female and children (0-9 years) with epistaxis were 8.46, 7.83, and 7.63 g/dl, respectively, while mean platelet levels were 239.23, 220.51, and  $198.08 \times 10^9$  [Table 4].

**Table 5: Laboratory factors affecting outcome among patients with epistaxis**

Variable	Good outcome	Poor outcome	Chi square	P
Blood group:				
A	41 (25.8%)	10 (6.3%)	2.674	0.447
B	20 (12.6%)	3 (1.9%)		
AB	14 (8.8%)	1 (0.6%)		
O	63 (39.6%)	7 (4.4%)		
Rhesus:				
Positive	133 (83.1%)	20 (12.5%)	0.009	0.926
Negative	6 (3.8%)	1 (0.6%)		
Genotype:				
AA	80 (64.5%)	8 (6.5%)	9.072	0.003
AS/SS	25 (20.2%)	11 (8.9%)		
Clotting profile:				
Normal	77 (39.7%)	13 (6.7%)	0.157	0.692
Abnormal	91 (46.9%)	13 (6.7%)		
Blood film:				
Normal	54 (30.0%)	9 (5.0%)	0.002	0.965
Abnormal	100 (55.6%)	17 (9.4%)		
Hemoglobin:				
Normal	54 (24.0%)	9 (4.0%)	0.019	0.890
Anemia	140 (62.2%)	22 (9.8%)		
Platelet:				
Normal	177 (78.7%)	31 (13.8%)	2.939	0.086
Abnormal	17 (7.6%)	0 (0%)		

Significance is *P* value less than 0.05

Pearson's correlation analysis showed significant association between patient's genotype and outcome of treatment in patients with epistaxis (Chi Square = 9.072, *P* value = 0.003). There was, however, a weak association between platelet counts of the patients and the outcome of treatment (Chi Square = 2.939, *P* value = 0.086) [Table 5].

Multiple logistic regression analysis revealed anterior epistaxis and AA genotype to be positive predictors of good outcome among patients with epistaxis (odds ratio = 3.020, *P* value = 0.034), (odds ratio = 7.577, *P* value = 0.001), respectively [Table 6].

## DISCUSSION

Epistaxis is a common otorhinolaryngological emergency, considered as the second common cause of spontaneous bleeding in humans, and associated with significant morbidity and possible mortality.<sup>[10]</sup> The mean age of occurrence of epistaxis among our cohort is in agreement with findings by other studies.<sup>[2,11,12]</sup> However, another author reported a relatively higher mean age of 64.3 years in the United States, though his patients

**Table 6: Determinants of outcome in patients with epistaxis**

Predictor	Odds ratio	90% confidence interval	P
Age:			
<19 years	Referent	0.55614.517	0.209
> 19 years	2.842		
Sex:			
Male	Referent	0.2421.623	0.340
Female	0.628		
Site of bleeding:			
Anterior	Referent		
Posterior	3.020	1.0908.369	0.034
Hemodynamic status:			
Stable	Referent		
Unstable	0.924	0.3862.214	0.859
Duration of bleeding:			
<24 h	Referent		
>24hours	1.597	0.6803.749	0.282
Severity of bleeding:			
No transfusion	Referent		
Had transfusion	1.138	0.8331.554	0.417
Complications:			
Absent	Referent		
Present	1.042	0.4582.371	0.921
Clotting profile:			
Normal	Referent		
Abnormal	0.695	0.2032.377	0.562
Genotype:			
AA	Referent	2.28125.169	0.001
AS/SS	7.577		
Hemoglobin:			
Normal	Referent	0.4082.177	0.890
Anemia	0.943		

were only those with posterior epistaxis.<sup>[13]</sup> The peak age of occurrence among our patients was similar to other studies in Nigeria.<sup>[7,12,14]</sup> In contrast, other studies from Nigeria and Nepal quoted lower figures, while Becka *et al.*, in Germany reported those above 65 years as most commonly affected.<sup>[5,11,15]</sup> The relatively low peak age of occurrence among Nigerians could be due to the predominance of the young in clinic attendances in the tropics.<sup>[16]</sup> The relatively lower life expectancy currently put at 52.2 years in Nigeria could also be a reason. There was a male predominance among our patients as similarly reported worldwide.<sup>[5-7,11,14,15,17-22]</sup>

The duration of epistaxis in the majority of our patients was less than 24 as also reported by another study in USA.<sup>[13]</sup> Recurrent epistaxis was found to be common among our patients similar to what was reported by a

similar study in Uganda.<sup>[23]</sup> The majority had 2 previous episodes in contrast to a mean of 3 episodes reported by authors in Nigeria and Tanzania.<sup>[6,12]</sup> Anterior epistaxis was a common presentation in our series in agreement with other series worldwide.<sup>[6,11,14,15,17,21]</sup> Majority of our patients had moderate to severe bleeding comparable to the findings by Viducich *et al.*<sup>[13]</sup> Moreover, up to 18% required blood transfusion as similarly reported by some authors.<sup>[6,12,14]</sup> Most of the patients in our series had bleeding from the left nasal cavity similar to report by Shrestha *et al.*<sup>[11]</sup> however, Gilyoma *et al.*<sup>[6]</sup> reported right nasal cavity as most common side affected, whereas Sambo *et al.*<sup>[14]</sup> and Damrose *et al.*<sup>[18]</sup> reported bilateral nasal bleeding as most common in their series. A large number of our patients were first seen at the emergency unit. Similarly, other authors reported same.<sup>[6,10,12]</sup> Majority of our patients were admitted on presentation, similar to findings by Gilyoma *et al.*<sup>[6]</sup>, however, Kodiya *et al.*<sup>[2]</sup>, reported lower incidence of admission in Kaduna, Nigeria. The average duration of hospital stay as reported by several other similar studies ranges from 3 to 7 days in agreement with our report.<sup>[2,6,12]</sup> As variously reported by authors worldwide, trauma was the most common cause of epistaxis in our series.<sup>[6,11,12,14,15,17,21]</sup> However in contrast, Iseh *et al.* and Kodiya *et al.* reported idiopathic as the most common cause in their cohorts.<sup>[2,5]</sup> The most commonly adopted modality of treatment among our patients was nasal parking, as previously reported<sup>[2,5,6,12-14,17,24,25]</sup> However, in contrast, Shrestha *et al.*, reported cauterization as their preferred modality of treatment in Kathmandu.<sup>[11]</sup> Complication rates among patients with epistaxis reported by authors range from 1.9 to 3.8%.<sup>[6,12]</sup> Our study reported a relatively higher complication rate probably due to the larger sample size and relatively higher number of patients with moderate to severe epistaxis. The commonest complication among our patients was hypovolaemic shock followed by recurrent epistaxis as similarly reported by Gilyoma *et al.*<sup>[6]</sup> Most of our patients were successfully treated and discharged home, as similarly reported by other authors.<sup>[6,11,18,20,26]</sup> Our review revealed a mortality rate of 3.1%, slightly lower to what was reported by Gilyoma *et al.*<sup>[6]</sup> but much higher than reported by Eziyi *et al.*<sup>[12]</sup>

Abnormal clotting profile was detected in a large number of our patients. Sandoval *et al.* in the USA similarly found majority of their patients to have coagulopathies.<sup>[19]</sup> Anemia was a common finding among our patients with epistaxis. However, in contrast, other studies reported lower prevalence of anemia in their cohorts.<sup>[18,20]</sup> This could be due to the relatively large number of our patients with coagulopathies, frequency of severe epistaxis and possible nutritional anemia

especially in the pediatric age group. Only 7.6% of our patients had abnormal platelet counts consistent with findings by other authors.<sup>[18,20]</sup>

Patient's genotype was significantly associated with outcome of treatment among our patients managed for epistaxis. A study in Uganda revealed prevalence of epistaxis to be higher among patients with sickle cell anemia and most presented with severe or recurrent epistaxis.<sup>[23]</sup>

Genotype (AA) and site of bleeding (anterior) were found to be significant positive predictors of good outcome among our patients with epistaxis. In contrast, Viducich *et al.* found severity and removal of pack within 48 h to be factors associated with rebleeding (poor outcome), though their series consisted of only patients with posterior epistaxis.<sup>[13]</sup> The retrospective design of our study is an important limitation.

## CONCLUSION

Epistaxis is a common occurrence especially among the youth in our environment. Our patients present commonly with moderate to severe epistaxis requiring admission and most times blood transfusion. Coagulopathies, anemia, and hemoglobinopathies are common findings among our patients. In addition to detailed history, physical examination with prompt and adequate intervention, complete blood laboratory investigations should be undertaken in selected patients with epistaxis.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Gabriel OT, Bamidele AO. Epistaxis in IdoEkiti, Nigeria: A 5-year review of causes, treatment and outcome. *Sahel Med J* 2013;16:107-10.
- Kodiya AM, Labaran AS, Musa E, Mohammed GM, Ahmad BM. Epistaxis in Kaduna: A review of 101 cases. *Afr Health Sci* 2012;12:479-82.
- Akinpelu OV, Amusa YB, Eziyi JA, Nwawolo CC. A retrospective analysis of aetiology and management of epistaxis in a southwestern Nigerian teaching hospital. *West Afr J Med* 2009;28:165-8.
- Adedeji TO, Bande SA. Epistaxis and its management in a tertiary health facility in Nigeria: A need for thorough evaluation. *West Afr J Med* 2014;33:195-200.
- Iseh KR, Muhammad Z. Pattern of epistaxis in Sokoto, Nigeria: A review of 72 cases. *Ann Afr Med* 2008;7:107-11.
- Gilyoma JM, Chalya PL. Etiological profile and treatment outcome of epistaxis at a tertiary care hospital in north-western Tanzania: A prospective review of 104 cases. *BMC Ear Nose Throat Disord* 2011;11:8.
- Ijaduola GTA, Okeowo PA. Pattern of epistaxis in the tropics. *Cent Afr J Med* 1983;29:77-80.
- Bhaumik NC, Sukla B, Das B, Dey D, Nandi TK. Pattern of epistaxis of patients attending in a tertiary care hospital of Tripura, north western region of India. *J Dental Med Sci* 2016;15:42-4.
- Khan MS, Marwat M, Khattak RA. Causes and management of epistaxis at a district hospital. *Rawal Med J* 2013;38:48-51.
- Adedeji TO, Sogebi OA, Tobih JE. Pattern of otorhinolaryngological admissions via emergency unit in a suburban tertiary center. *Int J Biomed Sci.* 2015;11:146-51.
- Shrestha I, Pokharel M, Shrestha BL, Dhakal A, Amatya RCM. Evaluation of aetiology of epistaxis and its management in Dhulikhel hospital. *Kathmandu Univ Med J* 2015;49:49-55.
- Eziyi JAE, Akinpelu OV, Amusa YB, Eziyi AK. Epistaxis in Nigerians; a 3-year experience. *East Cent Afr J Surg* 2009;14:93-8.
- Viducich RA, Blanda MP, Gerson LW. Posterior epistaxis: Clinical features and acute complications. *Ann Emerg Med* 1995;25:592-6.
- Sambo GU, Saidu AT, Kirfi AM, Sani M, Samdi MT. Epistaxis: The experience at Kaduna, Nigeria. *J Med Soc* 2014;28:81-5.
- Beck R, Sorge M, Schneider A, Dietz A. Current approaches to epistaxis treatment in primary and secondary care. *DtschArzbeil* 2018;115:12-22.
- Nwaorgu OGB. Epistaxis: An overview. *Ann Ib Postgrad Med* 2004;1:32-7.
- Siddique RU, Ghauri RA, Rafique KKM. Pattern of epistaxis and its treatment modalities: The Hyderabad experience. *J LiaquatUni Med Health Sci* 2006;5:58-61.
- Damrose JF, Maddalozzo J. Pediatric epistaxis. *Laryngoscope* 2006;116:387-93.
- Sandoval C, Dong S, Visintainer P, Ozkaynak MF, Jayabose S. Clinical and laboratory features of 178 children with recurrent epistaxis. *J PediatrHematolOncol* 2002;24:47-9.
- Patel N, Maddalozzo J, Billings KR. An update on management of pediatric epistaxis. *Int J PediatrOtorhinolaryngol* 2014;78:1400-4.
- Hussain G, Iqbal M, Shah SA, Said M, Sanaullah, Khan SA, *et al.* Evaluation of aetiology and efficacy of management protocol of epistaxis. *J Ayub Med Coll Abbottabad* 2006;18:63-6.
- Eze N, Lo S, Toma A. Advice given to patients with epistaxis by A & E doctors. *Emerg Med J* 2005;22:724-5.
- Nardo-Marino A, Williams TN, Olupot-Olupot P. The frequency and severity of epistaxis in children with sickle cell anaemia in eastern Uganda: A case-control study. *BMC Hematol* 2017;17:14.
- Kotecha B, Cocks RA, Rothera MP. The management of epistaxis in accident and emergency departments: A survey of current practices. *Arch Emerg Med* 1990;7:35-41.
- Adoga AA, Kokong DD, Mugu JG, Okwori ET, Yaro JP. Epistaxis: The demographics, etiology, management and predictors of outcome in Jos, North Central Nigeria. *Ann Afr Med* 2019;18:75-9.
- Patel N, Maddalozzo J, Billings KR. An update on management of pediatric epistaxis. *Int J PediatrOtorhinolaryngol* 2014;78:1400-4.