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Nasal bacterial colonization in cases of idiopathic epistaxis in children

Payal Kamble [a,*], Sonal Saxena [b], Sunil Kumar [a]

[a] Department of Otorhinolaryngology-Head & Neck Surgery, Lady Hardinge Medical College & Associated Hospitals Shaheed Bhagat Singh Marg, New Delhi 110001, India
[b] Department of Microbiology, Lady Hardinge Medical College & Associated Hospitals Shaheed Bhagat Singh MargNew Delhi 110001, India

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ABSTRACT

Objectives: To evaluate the role of nasal bacterial colonization in cases of idiopathic epistaxis in children.
Methods: A descriptive, hospital based, observational study in our hospital was conducted on total 112 pediatric patients in the age group 4–16 years. Group A (control): 56 patients with no epistaxis; Group B (epistaxis): 56 patients with idiopathic epistaxis. A swab for microbiological evaluation was taken from the anterior nasal cavity of each child.
Results: A highly significant association between nasal colonization with pathological *Staphylococcus aureus* and idiopathic epistaxis was found. The presence of pathological *S. aureus* colonization in the anterior nasal cavity was also associated with statistically significant number of crusting and presence of dilated blood vessels on the anterior nasal septum of children in epistaxis group.
Conclusion: Nasal bacterial colonization with *S. aureus* leads to a sequence of pathological events i.e. low grade inflammation, crusting and new vessel formation. This leads to irritation in nasal cavity resulting in digital trauma and subsequently epistaxis and thus it plays an important role in causing idiopathic epistaxis in children.

1. Introduction

Epistaxis is one of the most frequent emergencies in the practice of otorhinolaryngology. It has been shown to affect 10% of the entire population [1]. Although rare in children younger than 2 years of age, peak incidence is seen between 3 and 8 years of age affecting 30% of children younger than 5 year, 56% of children 6–10 years old and 64% of children in the age group of 11–15 years [2]. Recurrent idiopathic epistaxis in children is repeated and self-limiting nasal bleeding for which no specific cause is identified [3]. Extensive vascular supply to the nasal mucosa and increased frequency of upper respiratory infection in children make them susceptible to nose bleed with anterior nasal septum being the most common site [2]. By far the most common cause is trauma, either nose rubbing or digital trauma associated with inflammatory or infective cause [4]. Nasal colonization with *Staphylococcus aureus* has recently been postulated to play a role in this process. Its colonization causes inflammation, crusting and new vessel formation leading to epistaxis [4,5]. Trials showing benefit from antiseptic cream also provides supporting evidence for an infective cause for epistaxis [5,6]. However, there is a marked paucity in literature on the role of nasal bacterial colonization in children. Thus, the present study was aimed to evaluate the role of nasal bacterial colonization in cases of idiopathic epistaxis in pediatric age group.

2. Methods

The study sample comprised of total 112 pediatric subjects of either sex which was divided into two groups of 56 patients each. Group A (Control group) comprised of children with no complaints of epistaxis and upper respiratory or lower respiratory tract infection selected from outpatient department with other complaints like bilateral wax, speech problem etc. Group B (Epistaxis) group comprised of children with epistaxis presented to the outpatient department and emergency/casualty service in the hospital. Subjects were eligible for inclusion in the study if they were in the age group of 4–16 years with recurrent unilateral and or bilateral epistaxis. Subjects were excluded if they had an active upper respiratory tract infection or with a local or systemic cause for epistaxis. All were given full explanation regarding the procedure of study both in written and verbally. Signed consent for study participation was obtained from the parents.

* Corresponding author at: House No: 19/House Surgeon Block, Lady Hardinge Medical College, New Delhi 110001, India.
Tel.: +91 8800567276; mobile: +91 9718676066.
E-mail address: soni.kamble@ymail.com (P. Kamble).

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All patients were subjected to a detailed history and clinical examination. Anterior rhinoscopy was done in all the patients and all the parameters of epistaxis like site, laterality, crusting, dilated vessels, blood clots or active bleeding was recorded in a proforma. Blood samples of subjects in epistaxis group for complete blood count and coagulation profile was done to rule out any systemic cause of epistaxis. Few subjects underwent nasal endoscopy in which anterior rhinoscopy was doubtful to rule out any local cause of epistaxis.

A nasal swab with sterile cotton was used to collect sample from anterior nasal cavity under direct vision in all the subjects. After cleaning the area with sterile saline, cotton swab moistened with physiological sterile saline were rolled two to three times in both the anterior nasal cavity. The swab was then sent to the microbiology department where the swab was cultured on blood agar, chocolate agar and MacConckey agar. The plates were incubated for 18–24 h at 37 °C. The plates were examined and the colony morphology and other characteristics were recorded [18,19]. Further test for identification and antimicrobial susceptibility was carried out as per standard technique [20–22]. Any known respiratory pathogens both aerobic and anerobic were classified as normal flora and positive culture for pathological *S. aureus* and other pathological bacteria were expected.

Two separate sets of independent and identically distributed sample data were collected, tabulated in a Proforma and put to statistical analysis. The data was analyzed using Mantel Haenszel X^2 i.e. Chi square test with Yates correction and Fisher exact p value test for confirmation, wherever applicable using IBM SPSS version 19.0.

Ethical approval was further obtained from Ethics committee for Human Research Lady Hardinge Medical College and Associated Hospitals, New Delhi for a descriptive hospital based observational study of children age group 4–16 years in the year 2013–2015. The study was further approved by the "Medical Division" of the "University Board of studies", University of Delhi, New Delhi.

3. Results

A total of 112 subjects between 4 and 16 years were included in the study with 56 patients each in control and epistaxis group. Epistaxis group included 38 males and 18 females with mean age group of 7.55 years Table 1. In epistaxis group 43 (76.79%) had bilateral epistaxis while 6 subjects had epistaxis episodes from left nasal cavity and 7 from right nasal cavity.

On anterior rhinoscopy no abnormality was detected in control group, while in epistaxis group of 56 patients, 42(75%) had crusting present in the anterior part of nasal cavity, 20 (35.71%) out of these 42 patients with crusting had associated prominent blood vessels in the Little's area while only 3 subjects had blood clots or active bleeding at the time of examination (Table 2). In control group of 56 subjects, 11(19.64%) subjects had positive culture suggestive of *S. aureus*. Bacteria suggestive of normal nasal flora were isolated from 45(80.36%) patients which included commensals or respiratory pathogens (*S. epidermidis*, *yeast*, *diptheroids*, *S. pneumonia and M catarrhalis*) In epistaxis group 38 (67.86%) subjects had positive culture for *S. aureus*, 4 (7.14%) had *Escherichia coli*, *enterococcus* was detected in one patient while 13 (23.21%) had normal nasal flora. The difference was highly significant ($p = 0.001$) (Figs 1–3). The analysis of epistaxis group showed that the patients with crust in anterior nasal cavity are more likely to have positive culture for *S. aureus* (78.57%) than those without crust (35.71%) ($p = 0.014$). Similarly out of 20 subjects with prominent blood vessels along with crusting in the anterior nasal cavity 17 had positive culture for *S. aureus* i.e. 96.6% ($p = 0.037$) (Table 3).

Table 1
Age distribution in epistaxis and control group.

Age interval	Control (%)	Epistaxis (%)
4–5.9years	17 (30.36)	18 (32.14)
6–7.9 years	12 (21.43)	16 (28.57)
8–9.9 years	14 (25.00)	7 (12.50)
10–11.9 years	5 (8.93)	7 (12.50)
12–14 years	8 (14.29)	8 (14.29)
Total	56 (100)	56 (100)
Mean	7.55	7.46

Table 2
Observations on anterior rhinoscopy in epistaxis group.

Anterior rhinoscopy (56)	Number (%)
Crusting	42 (75)
Crusting without prominent vessels	23 (50)
Crusting with prominent vessels	20 (35.71)
Prominent vessels without crusting	0
Blood clots/bleeding	3 (5.36)
Normal	11

4. Discussion and conclusion

Epistaxis is one of the important emergency situations in otorhinolaryngology and affects all the age groups. In the present study performed on children, idiopathic epistaxis was found to be more prevalent in the age group of 4–8 years (60.71%) with the mean age of 7.55 year. Earlier studies have also reported the increased prevalence of epistaxis in 3–8 year of age group [2,3,7]. This can be attributed to the reason that children are more susceptible to upper respiratory tract infection and due to seasonal factors leading to nasal crusting and subsequently epistaxis. Present study we found that males were 2.1 times more commonly affected than females, previous studies also indicated a male preponderance [3,8,9,14]. Globally there is male preponderance in epistaxis except in geriatric age group [11–14]. The plausible explanation of this could be that young males are the most active in the population so are more vulnerable to trauma from nose picking especially among children. Epistaxis episodes showed a bilateral presentation in 76.79% of the patients in comparison to unilateral presentation. This could be because both the cavities are equally exposed to crusting and nasal trauma. Currently limited information is available in medical literature regarding the laterality in cases of recurrent and idiopathic epistaxis. In few of the studies it has been reported that epistaxis episodes are more common unilaterally compared to bilateral nasal cavity [8,10].

On anterior rhinoscopy crusting was the most common observation in 43 (76.79%) children with epistaxis, followed by

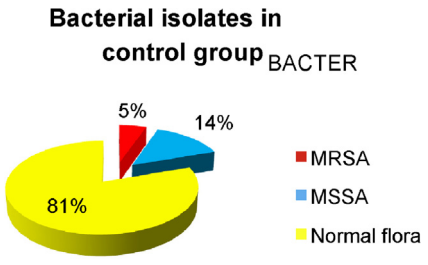

Fig. 1. Bacterial isolates on culture in Control group. Key: MRSA (methicillin resistant *Staphylococcus aureus*), MSSA (methicillin sensitive *Staphylococcus aureus*).