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ORIGINAL RESEARCH

Epistaxis and Its Associated Factors Among Precollege Students in Southern Ethiopia

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Background: Epistaxis is one of the most common otorhinolaryngological emergencies affecting the majority of the population in their lifetime, with some of them requiring serious medical attention. This study aimed to assess the prevalence and associated factors of epistaxis among pre-college students in Wolaita Sodo, Ethiopia.

Methods: An institution-based cross-sectional study was conducted. Data were collected using a pre-tested interviewer administered questionnaire. The study participants were selected by systematic random sampling technique. A logistic regression analysis was employed to assess the presence and strength of association factors with epistaxis. An adjusted odds ratio with 95% confidence interval was used to determine the presence and strength of the association at 0.05 level of significance.

Results: Of 387 participants, 57.1% of them were male, and the mean age of all participant was 18.05±1.401 SD years. The overall epistaxis prevalence was 108 (27.9%). Blood group O, which accounted for about 43.4% was more prevalent. Blood group O (AOR=3.96, 95% CI=1.5–10.4), participants who drink coffee daily (AOR=2.75, 95% CI=1.0–7.4), and participants who took a bath frequently with both hot and cold-water (AOR=4.55, 95% CI=1.1–18.6) were significantly associated with epistaxis.

Conclusion: The type of blood group, interval of coffee drinking, and type of bathing were significantly associated with epistaxis. Working on the identified associated factor and increased awareness about epistaxis for the students with effective first aid training is mandatory.

Keywords: epistaxis, blood group, southern Ethiopia, pre-college students

Introduction

Epistaxis is a bleeding from the nose due to rupture of tiny, distended vessels in the mucous membrane of any area of the nose.[1] There are a variety of causes associated with epistaxis, which are mainly categorized into an idiopathic and with symptoms of an underlying disease.[2] The majority of epistaxis are anterior bleeds type, which are responsible for about 90–95% of the cases.[3,4] In this type the most common site of bleeding is the anteroinferior aspect of the nasal septum in the anterior nasal cavity plexus vessels.[4] In posterior bleeding it is difficult to find the bleeding point and it is highly intense in many cases.[5] Posterior epistaxis is usually rare, it accounts for only 5–10% of cases.[6]

Although the majority of epistaxis cases are idiopathic,[7,8] some causes have been identified so far in different studies. Trauma,[7–9] hematological disorders,[2–4,8–11] anatomic deformities,[2,4,9] inflammatory reactions,[8,9] organ failure,[3,4,6,8,12] intranasal tumors,[2,3] cardiovascular diseases,[6,7,9] blood dyscrasias,[4,13] low humidity,[3,7,9,12] even

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vigorous nose blowing,[1,9] and nose picking[2,9,14] have been identified associated factors with epistaxis. In adults most cases are associated with medications such as non-steroidal anti-inflammatory drugs (NSAID)[5,6,9,10,12,15] and anti-coagulants such as heparin and warfarin.[4,6,8,11]

The most common inherited bleeding disorders associated with epistaxis are hemophilia A, hemophilia B, and von Willebrand diseases.[9,11] Epistaxis is the most common symptom in approximately 60% of the patients with von Willebrand's disease.[5] Superficial bleeding like epistaxis is usually associated with platelet defects or vascular disorders.[11] Epistaxis is a common bleeding event that may be a symptom of coagulopathy.[16,17] It is also more prevalent in a person with O-blood group. This blood type is associated with a lower expression of von Willebrand factor compared with non O-blood groups.[18] This blood group also has a longer bleeding time compared to other blood groups, which confers the relative bleeding tendency.[19] Therefore, this study helps to describe the extent of epistaxis and to predict the most likely factors associated with epistaxis.

There is limited study and data related to the associated factors of the case in the given area need to be identified. To the best of our knowledge, there is no study done in our setting to identify either the prevalence or associated factors on epistaxis. The true prevalence of epistaxis is hard to investigate because of the self-limiting characteristics of the disease. An episode of self-limiting epistaxis does not get reported.[12] This makes the problem mostly ignored, and results in limited awareness in society on emergency first aid management of the disease.[25] It is unclear how much the level of epistaxis is and which factors locally are associated to the case. Basically the distribution of epistaxis is common among young adults.[5,7] If no efforts are put to determine the factors locally influencing epistaxis, it will be difficult to manage and treat epistaxis. The aim of this study was to assess the prevalence and associated factors of epistaxis among pre-college students in southern Ethiopia.

Methods

Study Design and Settings

An institutional-based cross-sectional study was conducted. The study was conducted in Wolaita Sodo town, the administrative center of the Wolaita Zone of the Southern Nations, Nationalities, and Peoples Region, Ethiopia. The lowest altitude of the town is 1,600 and the highest is 2,222 meters above sea level. And the mean annual temperature is 20°C. In this city there are four pre-college (preparatory high schools); three of them private schools and the other is a public school. The estimated number of pre-college students was about 3,718.

Study Population

Students attending a preparatory high school in Wolaita Sodo town were used as a source of population. Selected students attending in a preparatory high school who fulfilled the inclusion criteria and were willing to participate in the study were the study population. Students who were on anti-thrombotic drugs and students who feel sick or had discomfort were excluded from the study.

Sample Size Determination

Sample size was calculated based on a single population proportion formula using the following assumptions. Due to the lack of a similar study in the study area, *P*-value=0.5 was used with 0.05 degree of freedom. After adding 10% potential non-response, the sample size became 422.

Sampling Method

The number and list of students in each school was obtained from the school director office of each preparatory high school. Based on the obtained information the study population was proportionally allocated to each preparatory high school under the study. For each high school, the allocated number of sample size of students was further allocated proportionally to each batch. The study subject was selected by systematic random sampling method. The first study subject was determined by lottery method.

Data Collection Tool and Procedure

Data was collected using a pre-tested and semi-structured interviewer administered questionnaire that is developed based on a previous study.[3,7,14,18–26] The questionnaire was first prepared in English and translated to local language (Amharic) for the data collection. The question was back-translated to English to check its consistency. The data collection tool contains questions related to socio-demographic characteristics of participants, epistaxis status, health-related factors, behavioral factors, and diet habits of the participants. The data were collected by five data collectors after receiving training.

Specimen Collection and Processing

The capillary blood from the finger was collected by cleaning the skin of the area around the fingertip with 70% isopropyl

alcohol in a circular fashion beginning at the site and moving out ward. And the blood was collected by piercing the fingertip with a sterile lancet. Drops of blood were placed onto microscopic slides and a thin blood film wass made on the first slide for blood morphology examination and the blood grouping was done on the other slides using anti-A, anti-B, and anti-D reagents. The prepared thin blood film was fixed on the slide using methanol alcohol. Slides were stained using Giemsa stain in batch in the laboratory. Finally slides were examined under a microscope.

Data Quality Control

Data quality was ensured from data collection up to final laboratory results by following the prepared standard operating procedure. The questionnaire was prepared in English then it was translated to Amharic for data collection and back-translated to English to check for consistency and completeness. Cross-checking of completeness of questionnaires was done during and after data collection. To ensure the validity and reliability of data collection, a pretest was done in Boditi secondary and preparatory high school in 5% of the sample size. Based on the finding of pre-test, necessary correction and modification were done.

Data Analysis and Interpretation

Data was first checked manually for completeness and then was coded and entered into Epi-Data version 3.1 statistical software and cleaned thoroughly before being transported to SPSS version 21 for further analysis. Descriptive statistics such as mean, frequencies, and percentages were used to describe and summarize the data. Binary logistic regression was used to determine the association between outcome variable and independent variables. Variables with a P-value≤0.25 in univariable binary logistic regression analysis were candidates for multivariable analysis and factors with $P<0.05$ in the final model were considered as statistically significant. The degree of association between dependent and independent variables were assessed using an adjusted odds ratio at 95% CI.

Ethical Approval and Consent to Participate

The study was conducted in accordance with the Declaration of Helsinki. Ethical clearance to conduct the study was obtained from the institutional ethical review of the college of medicine and health science, Arba Minch University. The institutional ethical review board was organized from seven committee members from different departments. Further permission was obtained from the zone education office and school directors before starting data collection. We guaranteed confidentiality by excluding names or any other personal identifiers from data-collection sheets and reports. The identifier for each eligible subject was replaced by a code, and no master code exists that allows the research data to be linked with the identifiers. Participants were informed about the aim of the study, the advantages of the study, and their rights even to stop in the middle of the procedure. Written and oral consent were taken from each participant before data collection. The study participants with critical results were attached to a clinical setting and all female participants with the Rh-negative blood group received information about what precautions they should take when they reach child-bearing age. All students with the history of epistaxis got training on emergency management of nose bleeding.

Results

Socio-Demographic Characteristics of Study Participants

A total of 387 students participated in the study, with a response rate of 91.7%. The mean age of participants'

Table 1 Socio-Demographic Characteristics of the Study Participants (n=387)

Variables Category		Frequency	Percent (%)
Age	15–17 18–20 >20	133 233 21	34.4 60.2 5.4
Sex	Male Female	221 166	57.1 42.9
Level of education	Grade 11th Grade 12th	211 176	54.5 45.5
Participants' Fathers Job	Daily laborer Governmental employee Merchant Private worker Farmer	52 187 94 45 9	13.4 48.3 24.3 11.6
Participants' Mothers Job	Housewife Governmental employee Merchant Private worker Farmer	165 121 76 23 2	42.6 31.3 19.6 5.9
Family Income	≤1,000 birr 1,001–3,000 birr >3,000	12 110 265	3.1 28.4 68.5

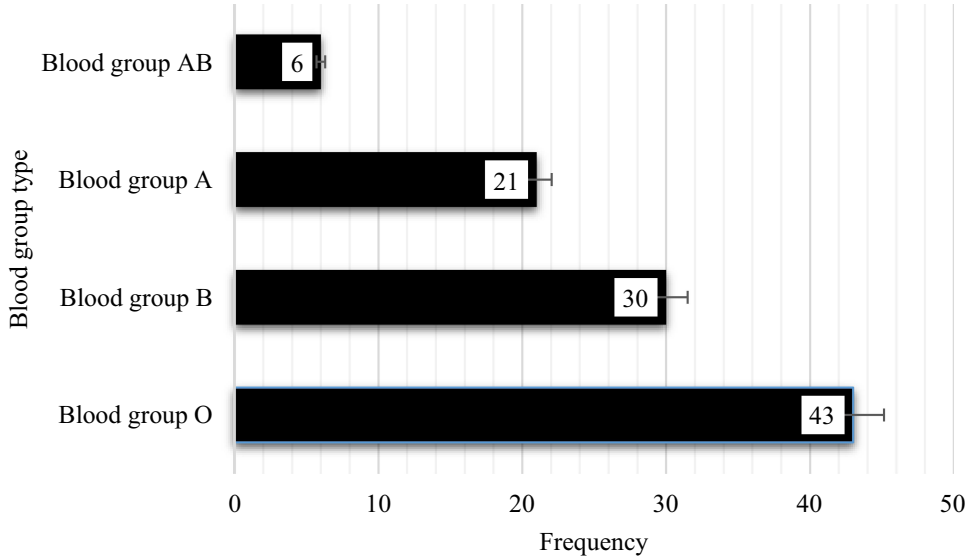

Figure 1 Blood group distribution of the study participants (n=387).

was 18.05±1.401 SD years. More than half (221, 57.1%) of the respondents were male. Regarding the job of the respondent's parent, 187 (48.3%) fathers were governmental employees and 165 (42.6%) mothers were housewifes. The majority of study participants (375, 96.9%) family income was above 1,000 birr per month (Table 1).

Blood Group Distribution, Health, and Behavioral-Related Characteristics of the Study Participants

The majority of study participants (43.4%) have blood type O, followed by blood type B, while AB was the least prevalent type (Figure 1). The majority (345, 89.1%) of participants had normocytic normochromic RBC appearance. Among 108 epistaxis cases, 37 (34.1%) of them had a family history of epistaxis and nine (2.3%) participants had heart disease. None of the study participants were aware of any coagulation disorder (Table 2).

A few (2.6%) of study participants had a history of alcohol consumption and, from those participants, six of them took once a week. Almost all (99.5%) participants had no history of cigarette smoking. Slightly higher than half of the study participant took a bath once a week, while nearly 40% of then took one 3-times per week. About one third of the participant used only cold water for bathing, and almost the same proportion use both warm and cold water (Table 2).

Habit of Diet of the Study Participant

More than half (61.8%) of the participants had no habit of eating "datta" (spice mainly prepared from chili pepper, ginger, and garlic). Half of the participants that had a habit of eating "datta" ate only once a day with different foods. From all participants, 186 (48.1%) of them had a history of drinking coffee. Of these, about one third of them drunk only

Table 2 Blood Group Distribution and Health-Related Characteristics of the Study Participants

Variables	Category	Frequency	Percent (%)
RBC Morphology	Normocytic Normochromic	345	89.1
	Normocytic Hypochromic	27	7.0
	Other	15	3.9
Heart Disease	Yes	9	2.3
	No	378	97.7
Alcohol	Yes	10	2.6
	No	377	97.4
Cigarette Smoking	Yes	2	
	No	385	99.5
Frequency of Bathing	Once a week	199	51.4
	Two times a week	30	7.8
	Three times a week	153	39.5
	Every day	5	
Type of bathing	Cold shower only	135	34.9
	Hot shower only	128	33.1
	Both hot and cold shower	124	32.0

once per week. One hundred and thirty-four (34.6%) of the participants reported the habit of drinking ginger tea and the majority of them drinking it 2–3 times in a week. Nearly half of the participants consumed vegetable as a usual food and 94 (39.8%) of them ate vegetables 2–3 times in a week. Slightly more than half of the participants had the habit of eating fruit and 81 (40.3%) of them ate it only once in a week (Table 3).

Prevalence of Epistaxis

The overall epistaxis level in this study was 108 (27.9%) (95% CI=23–32%). From all of the epistaxis participants, slightly more than half had their last episode within 3–6 months and 42.6% of them reported their number of episodes was between 2–5 periods within a year. The same proportion of epistaxis participants reported their bleeding time was between 7–10 minutes. About 30% of them responded that their cause of bleeding was stress only (Table 4).

Table 3 Habit of Diet of the Study Participants (n=387)

Variables	Category	Frequency	Percent (%)
Datta eating	Yes	148	38.2
	No	239	61.8
Datta eating frequency	Daily	105	71.0
	Once a week	40	27.0
	Sometimes	3	2.0
Coffee drinking	Yes	186	48.1
	No	201	51.9
Frequency of coffee drinking	Daily	62	33.3
	Once a week	67	36.0
	2–3 times a week	56	30.1
	Sometimes	1	0.6
Ginger tea	Yes	134	34.6
	No	253	65.4
Frequency of ginger tea	Daily	14	10.9
	Once a week	12	9.0
	2–3 times a week	97	72.4
	Sometimes	11	8.2
Types of food consumed	Vegetables	180	46.5
	Meat	51	13.2
	Cereals	89	23.0
	Vegetables and cereals	52	13.4
	Cereals and meat	15	3.9
Fruit Consumption	Yes	201	51.9
	No	186	48.1
Frequency of fruit consumption	Daily	50	24.9
	Once a week	81	40.3
	2–3 times a week	68	33.8
	Sometimes	2	1.0

Factors Associated with Epistaxis

Factors associated with epistaxis were assessed by binary logistic regression. In univariable analysis, sex, blood type, type and interval of bathing, frequency of "Datta" eating, frequency of coffee drinking, habit of drinking ginger tea, and fruit consumption had *P*-values less than 0.25 and the variables were selected for multivariable analysis. In multivariable analysis, the blood type of the students, coffee drinking, and type of bathing remained significantly and independently associated with epistaxis. Those participants with blood group O were about 4-times more likely to be affected by epistaxis than participants with non-O blood type (AOR=3.96, 95% CI=1.5–10.4). Epistaxis was 2.6-times higher in participants who drink coffee daily than those

Table 4 Epistaxis-Related Characteristics of the Study Participants (n=108)

Variables	Category	Frequency	Percent (%)
Last episode of epistaxis	Before 1 year	4	3.7
	6–12 months	36	33.3
	3–6 months	57	52.8
	<3 months	11	10.2
Number of episodes within a year	Once	4	3.7
	2–5	46	42.6
	6–7	39	36.1
	8–10	14	13.0
	>10	5	4.6
Nasal bleeding time	2–3 min	42	38.9
	4–6 min	19	17.6
	7–10 min	46	42.6
	>10 min	1	0.9
Cause of nasal bleeding	Trauma only	8	7.4
	Nose picking	14	13.0
	Dry weather only	27	25.0
	Stress only	32	29.6
	Hot bath	1	0.9
	Both dry weather and hot bath	3	2.8
	Both dry weather and stress	11	10.2
	Both trauma and stress	12	11.1

Table 5 Factors Associated with Epistaxis Among the Participants (n=387)

Variables	Epistaxis	None Epistaxis	COR (95% CI)	AOR (95% CI)	*P*-value
Sex					
Male	77	144	2.33 (1.4–3.8)	2.09 (0.7–5.8)	0.158
Female	31	135	Ref.	Ref.	
Blood group					
Non-O-blood group	43	176	Ref	Ref.	
O-blood group	65	103	2.58 (1.6–4.1)	3.96 (1.5–10.4)	0.005*
Interval of bathing					
Once per week	55	144	1.13 (0.7–1.8)	0.59 (0.2–1.8)	0.364
Twice per week	13	17	2.26 (1.0–5.1)	0.79 (0.2–3.8)	0.766
More than twice per week	40	118	Ref.	Ref.	
Type of water for Bathing					
Cold water	24	111	Ref.	Ref.	
Hot water	40	88	2.10 (1.2–3.7)	1.98 (0.6–6.4)	
Both hot and cold water	44	80	2.54 (1.4–4.5)	4.55 (1.1–18.6)	0.035*
Datta eating interval					
Daily	54	51	2.74 (1.3–5.9)	1.13 (0.3–4.7)	0.868
No daily	12	31	Ref.	Ref.	
Coffee drinking habit					
Yes	71	115	2.74 (1.7–4.4)	2.6 (0.9–7.3)	0.064
No	37	164	Ref.	Ref.	
Coffee drinking frequency					
Daily	32	30	2.33 (1.2–4.3)	2.75 (1.0 −7.4)	0.044*
Not Daily	39	85	Ref.	Ref.	
Drinking Ginger tea					
Yes	52	82	2.23 (1.4–3.5)	1.5 (0.5–4.3)	0.416
No	56	197	Ref.	Ref.	

Note: *Significant association.

participant who do not drink daily (AOR=2.75, 95% CI=1.0–7.4). Participants who took baths by both hot and cold-water were 4.6-times more likely to develop epistaxis than those who took cold showers (AOR=4.55, 95% CI:=1.-1–18.6) (Table 5).

Discussion

The findings from this study showed that 27.9% (95% CI=23–32%) of the study participants had epistaxis. This finding is in line with the study conducted in Dar es Salaam, Tanzania (23.4%).[7] In this study the level of epistaxis is higher compared to the findings of studies conducted in India (7.5%) and Nigeria (0.5%).[3,28] This discrepancy could be because the study finding only represents the result from a single hospital and may be due to inadequate samples in the Nigerian study. Many studies[3,12,15,27] conducted on epistaxis are hospital-based, but epistaxis cases are mostly self-limiting,[12] and only a few seeks medical attention;[6,7] so that the number of cases that will be presented in a health institution are rare.

Contrary with the above findings, the current study showed that the level of epistaxis is lower than the studies conducted in Saudi Arabia and India, where the level of epistaxis were 49% and 45%, respectively.[12,15] This might be attributable to the fact that the findings of a study conducted in Saudi Arabia were due to an incorporated large number of participants that were found in the kingdom of Saudi Arabia. In the case of India the discrepancy may be due to the different study design, which is retrospective, and the data collected for a prolonged time.

Out of the 108 participants with epistaxis, 60.2% of them were known to have blood type O, which was also significantly associated with the case. This indicates the prevalence of epistaxis is higher in blood type O than in the

participants with other blood groups. Similar findings were observed in studies done in Nepal and India.[18,27] The possible reason for the observed high association may be that the O blood group is known to be associated with a lower expression of von Willebrand factor which plays an important role in clotting compared with non-O blood groups. Bleeding time is recorded to be slightly longer in blood group O.[19]

Type of bathing was also found to be significantly associated with epistaxis. In the current study participants who took a shower frequently by both hot and cold-water were more likely to developepistaxis. This may be due to the fluctuation in body temperature that affects the blood pressure of the participants. A study conducted in China showed the hourly temperature had a significant lag effect on blood pressure.[28] Blood pressure changes with temperature based on different temperature and variation in blood pressure may induce epistaxis. Some other studies[3,7,17,26,29] show significant relations between epistaxis and hypertension. Unlike in our study, ingesting hot beverages and taking a hot bath were also highlighted as a contributing factor for epistaxis.[30] The variation observed may be due to the study season and the difference in environmental temperature.

In the current study, the interval of coffee drinking habit was associated with epistaxis. Study participants who drink coffee daily were more likely to develop epistaxis than their counterparts. The findings of another study showed that caffeine in energy drinks has a nose bleeding effect.[31,32] One of the most common causes of nose bleeds is dryness in the nasal passages, which can occur as a result of caffeine. This may be because caffeine dries out the body by pulling moisture from the mucous membranes of the nasal passages.

Conclusion

This study revealed that the level of epistaxis among preparatory students in Wolaita Sodo is relatively high. Blood type O, drinking coffee daily and bathing with warm and cold water were significantly associated with epistaxis. Working on the identified associated factor is important to reduce the effect of the cases. It is better to increase awareness about epistaxis for the students and it is also better to give first aid training for the school community. Therefore, the health office and health extension workers need to better strengthen and maintain the local information dissemination network on epistaxis and its right time of commencement community-based information education and communication on epistaxis.

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Disclosure

The authors report no conflicts of interest for this work.

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