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Extreme Dry Climate

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EFFECTS OF EXTREME DRY CLIMATE OF SUDAN ON PAKISTANI PEACEKEEPERS

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ABSTRACT

Objective: To determine the frequencies of nasal itching, epistaxis, dry/chapped lips and xerosis of skin among Pakistani peacekeepers exposed to the dry climate of Nyala, Sudan.
Study Design: Prospective cohort study.
Place and Duration of Study: Pakistan Field Hospital 6 Nyala, Sudan, from February 2014 to May 2012.
Material and Methods: Total 144 United Nations Pakistani Peacekeepers of Pakistan Field Hospital 6(all ranks) were selected by non-probability convenient sampling. The data consists of frequency of four symptoms was collected after three months of exposure to dry climate.
Results: The most common symptom was dryness of skin (36.1%) followed by chapping of lips (29.9%) while nasal bleeding (epistaxis) was least common (9%). Significantly higher number of subjects of ages more than 40 years had nasal bleeding compared to the younger group (*p* value 0.002).
Conclusion: Exposure to extreme dry climate affects skin and nasal mucosa. Frequency of epistaxis found to be significantly more in subjects older than 40 years as compared to younger ones.

Keywords: Dry climate, Epistaxis, Lip chapping, Xerosis.

INTRODUCTION

Africa in general is known for its hot and dry climate with few months of the year having very low humidity levels. The relative humidity in Sudan, according to various weather sites goes as low as 15 to 20 percent during February to May. While in Pakistan the relative humidity rarely drops below 30 percent and is commonly lowest in the months of April and May. Latitude of Nyala (Sudan) is 12.05, Quetta (Pakistan) 30.25 and of Lahore (Pakistan) 31.55. For the last few years most of the United Nations Missions of Pakistan, deployed in Nyala, Sudan assumed their duties in January or February. Therefore exposure to sudden variation of Humidity level is a major concern for every peacekeeper. Skin and nasal mucosa are directly affected by dry climate. Studies carried out in Greece[1], Nigeria[2], Nepal[3] and Japan[4] have proved association of dryness with higher epistaxis events. Similarly dry climate causing dryness of skin has also been studied in Germany[5] and southern Japan[6]. These early mild to moderate symptoms of nose and skin are fairly common in low moist climate, although not dangerous but quite disturbing and hamper daily life routine. Therefore, the objective of this study was set to determine the frequencies of nasal itching, epistaxis, chapped lips and xerosis of skin among Pakistani peacekeepers exposed to the dry climate of Nyala, Sudan.

Furthermore we compared these symptoms between the two age groups to test the hypothesis that there is no difference of frequencies of these four symptoms (nasal itching, epistaxis, dry/chapped lips and xerosis of skin) between subjects of more than 40 years and of equal or less than 40 years of age.

MATERIAL AND METHODS

This was a prospective cohort study carried out on 144 United Nations Pakistani Peacekeepers of Pakistan Field Hospital 6 (all ranks), which were selected by non-probability convenience sampling. Study was carried out in Pakistan Field Hospital-6 Nyala, Sudan from February to May 2014. The target population was all the Pakistani healthy adults coming to Sudan

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and exposed to dry climate. The accessible population was all Pakistani peacekeepers serving in Nyala, Sudan in 2014. In addition to the routine pre induction medical examination by all the specialists in Pakistan another detailed history and examination was carried out by ENT and Skin Specialist at Nyala, Sudan. All willing, healthy Pakistani peacekeepers serving in Nyala, Sudan from February to May 2014 were recruited in the study. Those having past history of skin diseases or moderate to severe nasal bleeding were excluded from study. Those with any cardiovascular disease, diabetes mellitus, asthma, nasal/skin allergies were also excluded. The data of frequency of following symptoms were collected after three months of exposure. Subjects were helped by the author to complete a questionnaire at the start and at the completion of study period to collect data.

Itching/dryness in Nose

Nasal bleeding

Dryness/ chapping of lips

Dryness/xerosis of skin

The results were analyzed by using SPSS 19. Descriptive statistics in the form of frequencies of all four symptoms in all the 144 subjects were calculated. The two comparisons of sub groups were analyzed for the statistical significance of difference by applying chi-square tests. The *p* value of less than 0.05 was considered to be significant.

RESULTS

Mean age of all 144 subjects was 35.01 years (standard deviation 6.4). The range was 24-53 years. There were 44 (30.6%) subjects of the ages more than 40 years and 100(69.4%) had equal or less than 40 years of age. As for the gender distribution134 (93.1%) were male and 10 (6.9%) were female. The most common symptom was dryness of skin (36.1%) followed by chapping of lips (29.9%). Itching in nose was seen in 16.7%, while nasal bleeding (epistaxis) was least common (9%).

The frequencies of all these four symptoms were compared between two age groups by applying chi square test (Table-I).

Group A: equal or less than 40 years.

Group B: more than 40 years.

Only the difference of symptom of nasal bleeding was found to be statistically significant between these two groups (*p* value 0.002). Significantly higher number of subjects of ages more than 40 years had nasal bleeding compared to the younger group. Incidence rate of nasal bleeding in Group B was 20 per 100 subjects while in Group A 4 per 100 subjects. There was five times greater risk of having nasal bleeding in subjects of group B as compared to group A.

Second comparison was carried out between two geographical groups based on the fact that whether subject is coming from relatively more dry climate area or less dry climate area in Pakistan.

Table-I: Comparison of two groups based on age difference for frequencies and incidence rates.

Symptoms	Groups	Frequency(%)	*p* value
Nasal Itching	>40 years (n=44)	11 (25%)	0.075
	<40 years (n=100)	13 (13%)	
Nasal bleeding	>40 years (n=44)	9 (20.5%)	0.002
	<40 years (n=100)	4 (4%)	
Lip chapping	>40 years (n=44)	11 (25%)	0.398
	<40 years (n=100)	32 (32%)	
Skin Dry/Xerosis	>40 years (n=44)	21 (47.7%)	0.054
	<40 years (n=100)	31 (31%)	

More dry areas group (Balochistan, Sindh): Subjects coming from Balochistan, Interior Sindh excluding coastal areas and Southern Punjab.

Less dry areas group (Punjab, KPK): Subjects coming from Central Punjab, Khyber Pakhtunkhwa and all coastal areas.

Although subjects coming from less dry areas group were found to have higher incidence rates of these symptoms than other group but the difference was not statistically significant for any of the symptom as shown in Table-II.

Likewise the means of relative humidity levels of four most dry months of Quetta (Balochistan) and Lahore (Punjab) is shown in the fig. When these means were compared by applying paired sample t test, the difference was again not statistically significant (*p* value 0.078). These two cities represent the two geographical groups based on having less or more dry climate in Pakistan.

However difference of relative humidity between Nyala (Sudan) and Lahore(Punjab) was highly statistically significant (*p* value 0.011). The difference between Nyala (Sudan) and Quetta (Balochistan) was also statistically significant (*p* value 0.008).

DISCUSSION

The uniqueness of this study is that milder forms of symptoms of nose and skin were studied in otherwise healthy subjects, and such initial symptoms are rarely studied in previous research work conducted in hospitals. While in our study all the subjects were exactly and equally exposed day and night to 3 months of extreme dry climate of Nyala, Sudan without even a single day lapse.

A correlational study between epistaxis events and 18 meteorological factors, conducted in Greece, proved the dependence of epistaxis on water vapour pressure. They concluded that low amount of water vapour in the atmosphere can be responsible for higher numbers of epistaxis events[1]. In our study we mainly considered one meteorological factor that is relative humidity into consideration. There is not much difference of temperatures in summer between Pakistan and Sudan. In our study 16.7% had nasal itching and 9% of total 144 complained of epistaxis. Another similar study was carried out in an African country Nigeria where review of 101 epistaxis cases proved that dry-hot and cold harmattan weather had the highest prevalence of epistaxis[2]. This result supports our findings of quite a higher

Table-II: Comparison of subjects coming from more dry areas with less dry areas in Pakistan for frequencies and incidence rates.

Symptoms	Groups	Frequency (%)	Incidence rate / 100	*p* value
Nasal Itching	Balochistan, Sindh (n=39)	5(12.8%)	13	0.450
	Punjab, KPK (n=105)	19(18.1%)	18	
Nasal bleeding	Balochistan ,Sindh (n=39)	2(5.1%)	5	0.320
	Punjab, KPK (n=105)	11(10.5%)	10	
Lip chapping	Balochistan, Sindh (n=39)	7(17.9%)	18	0.057
	Punjab, KPK (n=105)	36(34.3%)	34	
Skin Dry / Xerosis	Balochistan, Sindh (n=39)	14(35.9%)	35	0.974
	Punjab, KPK (n=105)	38(36.2%)	36	

frequency of nasal symptoms during hot and dry summer of Nyala, Sudan. A prospective study of Nepal demonstrated that temperature and humidity play an important role in the etiology of primary epistaxis[3]. They found good correlation between epistaxis and temperature and average correlation between epistaxis and relative humidity. Another study conducted in Cornwall, UK stated that temperature and water vapour pressure demonstrated statistically significant association with epistaxis admission rates[7]. However another study conducted in UK between 1997-2002 with sample size of 1830 patients, proved that there is no correlation between epistaxis and seasonal variations[8]. Climate in UK is altogether different compared to hot and dry summer of Sudan.

The comparison of two age groups demonstrated only statistically significant difference of one symptom that is epistaxis, higher in troops more than 40 years of age. Similar result was demonstrated in a retrospective cohort study (n=2405) according to which, epistaxis events occurred more commonly during winter season and in older patients[9]. A study conducted in 1986 stated that epistaxis most often occurred between September and March, and during these months they found periods of several days with more than 4 patients in 2 days. At least 2 days before and during those periods there were impressive changes of atmospheric pressure and humidity, whereas temperature and wind speed had less influence[10]. Our study assessed the generalized impact of whole 3 months dry season which is more appropriate way to measure the gradual changes in skin and nasal mucosa instead of few days. In a retrospective study conducted in Brazil, dry climate didn't present a correlation with the increase of the severity and the number of hospital admissions for epistaxis[4]. This difference of opinion with regard to relative humidity may be because the lowest humidity percentage is still more than the mean monthly humidity percentages in Nyala, Sudan. Yet in another retrospective study, cold temperatures 2 days prior to Emergency Department presentation were related to the increased incidence of epistaxis however no association was found with changes in relative humidity[11].

In hot and dry climates, skin is typically moisturized by sweat that is secreted because of thermoregulatory trait of eccrine sweat glands. Speedy winds, however, may dry the skin as well, because the air currents always draw the moisture away and by thinning the boundary layer increase the gradient of water vapor pressure[12] .This will increase water loss from the skin in particular on those areas that are unclothed like facial area sand directly exposed to the dry air. Wearing clothes in hot and dry climate conditions, which protect against Ultraviolet radiation primarily, may also be helpful in protecting the skin from excessive loss of moisture[13]. A study conducted on hairdresser appendices in Germany provided compelling evidence that climatic conditions like Absolute Humidity act as an independent risk factors for irritant hand dermatitis[5]. Symptoms in the mucous membrane (eyes, nose and throat) and

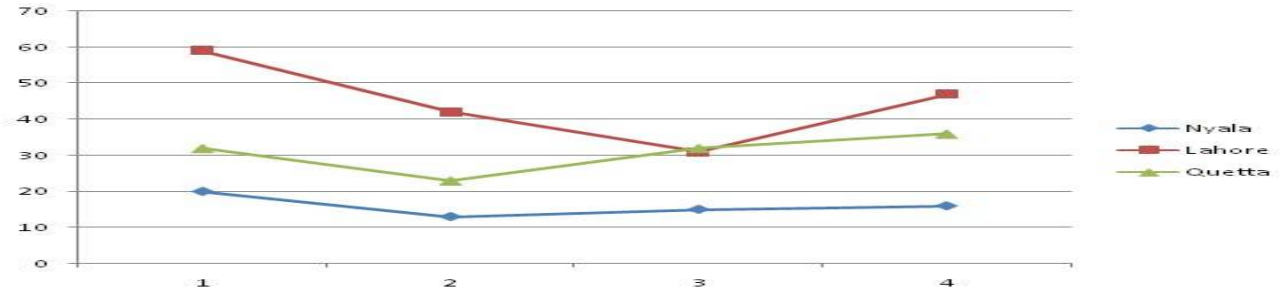

Figure: Monthly mean relative humidity percentages of Nyala, Lahore and Quetta.

skin increased considerably in the winter and spring[6]. Our study has also showed quite high frequencies of xerosis of skin and lip chapping.

In future studies microscopic findings of the changes in skin and mucosa may also be included as evidence. It is recommended that all the peacekeepers travelling to such African extreme dry climate are to be educated as well as supplied with appropriate moisturizers for enhancing their performance. As the younger ones get acclimatized more easily, during selection priority should go to younger peacekeepers.

CONCLUSION

Exposure to extreme dry climate affects skin and nasal mucosa. Frequency of epistaxis found to be significantly more in subjects older than 40 years as compared to younger ones.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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