# Nasal Itching And Bleeding Due To Excessive Exposure To Air Conditioners

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ABSTRACT:

Introduction: Nasal mucosa is very sensitive when it is exposed to extreme dry and cold weather conditions. Persistent or recurrent nasal itching due to such exposure is usually followed by the epistaxis. Objective of the study was to analyze effects of excessive exposure to dry and cold air of air conditioners on nose in terms of nasal itching and epistaxis.

Methods: This prospective cohort study carried out on 144 healthy Pakistani individuals working in United Nations Hospital in Nyala, Sudan from February 2014 to May 2014. Individuals spending less than 8 hours daily inside air conditioners were compared to those spending more than 15 hours daily. Chi square tests were applied to compare the proportions of incidence of nasal itching and epistaxis between these two groups as well as between two age groups.

Results: Mean age of all 144 subjects was 35.01 years (± 6.4). Chi square test results confirmed that there was statistically significant difference of both the symptoms (nasal itching p-value 0.021 and nasal bleeding p-value 0.044) between two groups. Those spending more time in air conditioners were significantly more affected by dry and cold air. As for as the age group is concerned significantly higher number of subjects of ages more than 40 years had nasal bleeding compared to the younger age group (equal or less than 40 years).

Conclusion: Effects of exposure of dry air of air conditioners on nasal mucosa in terms of nasal itching and nasal bleeding were found to be significantly higher when subjects were exposed 15 hours or more per day. Furthermore nasal bleeding was more commonly seen in elderly subjects (more than 40 years) due to such exposure.

Key Words: Dry air, Cold air, Air conditioners, Nasal itching, Nasal bleeding, Nasal mucosa.

INTRODUCTION:

Nasal mucosa is very sensitive when it is exposed to extreme dry and cold weather conditions. The frequency of primary epistaxis was seen to be higher during the cold period from October to March in Pakistan[1]. Indoor air quality in Brazilian universities was studied and they summarized that the indoor air quality in Brazilian university classrooms affects the health of students. Therefore, indoor air pollution needs to be considered as an important public health problem[2]. Persistent or recurrent nasal itching is usually followed by the epistaxis.

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Another study conducted in Kaduna, Nigeria mentioned in the findings that dry-hot and cold harmattan weather had the highest prevalence of epistaxis[3]. Dry and cold weather has the same effects as of dry and cold air of air conditioners without humidifiers. This public health issue which needs in-depth analysis of indoor working and living conditions to minimize different health problems. We found an appropriate group of people (by virtue of being placed in United Nations Hospital duties in Sudan) to study the effects of exposure of cold and dry conditions in air-conditioned rooms. All this study population was closely monitored and all of them did not leave that place during the study period because of official commitments. Objective of the study was to analyze effects of excessive exposure to dry and cold air of air conditioners on nose in terms of nasal itching and epistaxis.

METHODS:

This prospective cohort study carried out on 144 healthy Pakistani individuals working in United Nations Hospital in Nyala, Sudan from February2014 to May 2014. Non probability convenience sampling technique was adopted. All willing male and female adults were recruited in the study after obtaining written consent. All were medically examined by ENT specialist and those having significant intranasal pathology, past history of moderate to severe epistaxis or allergic rhinitis were excluded. Additionally those with cardiovascular disease, diabetes mellitus, asthma were also excluded. Subjects were followed for

three months and based on final data they were divided into following two groups. Those not fitting in either group (with 8 to 15 hours indoor time) were also excluded from study.

Group A: Spending more than 15 hours daily inside air-conditioned modules

Group B: Spending less than 8 hours daily inside air-conditioned modules

In addition of demographic data, data of daily time spent inside air conditioner rooms, occurrence of nasal itching and epistaxis was endorsed in pre-defined proforma. All subjects were questioned as well as examined by ENT specialist regarding these two variables (nasal itching and epistaxis). After exposure of three months subjects having developed these variables were endorced in proformas. The results were analyzed by using SPSS 19. Descriptive statistics (percentages) of demographical data (age, gender, weight) were performed. Chi square tests were applied to compare the proportions of frequencies of nasal irritation and epistaxis between groups. Prevalence of same two symptoms were also compared between two age groups. The two comparisons of 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 (± 6.4) and the age 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. There was no statistically significant difference of age, gender and weight between two groups (A and B).

After applying chi square tests the results confirmed that there was statistically significant difference of both the symptoms (nasal itching p value 0.021 and nasal bleeding p value 0.044) between Group A and Group B. Those spending more time in air conditioners (Group A) were significantly more affected by dry and cold air. We also compared the occurrence of these symptoms between age groups of more than 40 years and equal or less than 40 years. Only the difference of symptom of nasal bleeding was found to be statistically significant between these two groups (chi-square test, 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 more than 40 years group was 20 per 100 subjects while in younger group 4 per 100 subjects. There was five times greater risk of having nasal bleeding in older subjects more than 40 years old. Based on results all the affected individuals were managed accordingly.

| Symptoms | Symptoms Present / Absent | Group B Less than 8 hours in AC per day | Group B More than 15 hours in AC per day | P value (pearson chi - square test) |
|---|---|---|---|---|
| Nasal Bleeding | Absent | 70 | 61 | 0.044 |
| | Present | 3 | 10 | |
| Nasal Itching | Absent | 66 | 54 | 0.021 |
| | Present | 7 | 17 | |

DISCUSSION:

Effects of dry and cold air of air conditioners on nasal mucosa are usually milder in nature but in rare situations these effects are moderate to severe where prolonged indoor stay becomes inevitable. Hot and dry as well as hot and humid conditions in different parts of the world make survival difficult without air conditioners. Moreover how close to air conditioner one is sitting is a significant factor. Humidifiers are useful to avoid damaging dry air but these are seldom used. Very few studies available in medical journals regarding research on effects of indoor air quality and air conditioners etc. Mostly environmental experts have been doing such analysis.

Different studies have been carried out to see the effects of dry cold air on human body in different parts of the world. A research was performed in Hazara division, Pakistan with objective to determine the frequency of primary epistaxis and its relationship with temperature and relative humidity[1]. A total of 460 patients were included, out of which 206 (44.8%) had primary epistaxis. The frequency of primary epistaxis was seen to be higher during the cold period from October to March. These are the winter season months with cold and dry climate. Another study in Brazil evaluated the indoor air quality in Brazilian universities by comparing thirty air-conditioned (AC) (n = 15) and naturally ventilated (NV) (n = 15) classrooms[2]. They concluded that the studied AC rooms show parameter values that did not comply with the standard Brazilian legislation for air quality suggesting that the performance of maintenance, housekeeping, and control of air conditioning activities affected the quality of indoor air. These parameters were directly related to public and occupational health and are excellent indicators of SBS (Sick building Syndrome).

A retrospective review of 101 patients seen with epistaxis at the National Ear Care Centre, Kaduna over 7years (January 2002– December 2008) dry-hot and cold harmattan weather had the highest prevalence of epistaxis[3]. Trauma and infections were the main aetiological factors identified but over 40% of cases are idiopathic in origin.

Pierre Fontanari concluded that the activation of cold

receptors or osmoreceptors in the nasal mucosa induces protective bronchoconstrictor responses in normal individuals[4]. Receptor level analysis would be far more accurate especially when symptoms are mild to moderate. We only adopted clinical assessment to assess effects on nasal mucosa.

Togias et all assessed the effect of cold, dry air (CDA) on the nasal mucosa in relation to the release of inflammatory mediators associated with mast cells[5]. They concluded that cold, dry air causes the release of inflammatory mediators possibly associated with mast cells and speculate that such a mechanism may be involved in the bronchospasm induced by cold, dry air in asthmatics. In our study dry cold air of air conditioners was effecting the nasal mucosa although we did not have the facility to assess exact pathological events at mucosal levels.

A literature review by Koskela in 2007 described the mechanisms and management of cold air-provoked respiratory symptoms[6]. The review included human epidemiological studies, human and animal experimental studies, as well as human studies about management of the cold air-provoked respiratory symptoms. He concluded that the mechanisms beyond cold air-provoked respiratory symptoms vary considerably and mainly depend on the individual`s susceptibility and the ventilation level during the cold exposure. About 90% of our time is spent indoors where we are exposed to chemical and biological contaminants and possibly to carcinogens. Reports of indoor moulds or dampness or both are consistently associated with increased respiratory symptoms but causality has not been established[7]. Mahmoud investigated IAQ (Indoor air quality) in 16 mechanically ventilated schools in Qatar during the winter season. Parameters such as temperature, relative humidity, carbon monoxide (CO), carbon dioxide (CO2) and particulate matters (PM10 and PM2.5) were measured indoors and outdoors simultaneously. According to results of this study, some recommendations were suggested to reduce exposure of school children to high indoor levels of these pollutants as well as to provide comfortable learning environments[8].

Various researchers have studied other aspects of cold and dry air effects on nose and respiratory system. Togias et al studied the effect of azatadine on preventing the release of histamine after nasal challenge with cold, dry air and its effect on antagonizing nasal challenge with histamine[9]. A couple of animal studies are also available in literatue, Baile studied effect of cold and warm dry air hyperventilation on canine airway blood flow, suggesting that drying may be a more important stimulus than cold for increasing airway blood flow[10]. While Van Oostdam evaluated effect of breathing dry air on structure and function of airways in guinea pigs and he concluded that breathing dry air produces an acute reduction of extravascular water of the loose connective tissue of the airways and an increase in the maximum response to histamine[12]. Giannetto et al studied effect of Calcination in Dry Air in terms of conversion of light alkanes into aromatic hydrocrbons VII aromatization of propane on Gallosilicates[11]. In another study on effect of a 5-lipoxygenase inhibitor on asthma induced by cold, dry air, Israel concluded that selective inhibition of 5-lipoxygenase by A-64077 is associated with a significant amelioration of the asthmatic response to cold, dry air, suggesting that 5-lipoxygenase products are involved in this response[13]. Reactivity of Spanish coal chars in dry air was evaluated and the effect of potassium was inhibited in a char because of the high silica content of its ashes[14]. Salah et al have found that dry air breathing results in excessive water loss by the nasal mucosa, which may in turn slow the nasal mucociliary transport in healthy subjects[15]. Similarly Naclerio have found that bidirectional nasal breathing of cold dry air results in a reaction that is qualitatively similar to that induced when air is only inhaled through the nose and exhaled through the mouth[16]. Osmolality of nasal secretions increases when inflammatory mediators are released in response to inhalation of cold, dry air[17]. While a research on reflex activation of nasal secretions by unilateral inhalation of cold dry air supports the importance of neural mechanisms in airway responsiveness to an environmental stimulus[18]. Braat et al concluded that the new standardized intranasal cold dry air provocation method seems to be more suitable than histamine for characterizing and assessing the presence and degree of nasal reactivity in non allergic non infectious perennial rhinitis[19]. A work on CPAP (continuous positive airway pressure) revealed that mouth leak with nasal CPAP increases nasal airway resistance and this response can be largely prevented by fully humidifying the inspired air[20]. Eleven subjects complaining of symptoms of rhinitis when exposed to cold and dry environments were challenged by nasal breathing, first with warm, moist air and then with cold, dry air. Leukotriene production in response to physical stimulus suggested possible role of inflammatory mediators in pathological conditions, such as exercise induced asthma, that involve causative factors[21]. Combined use of histamine and tryptase measurements can provide useful evidence regarding role of mast cell activation in the pathogenesis of inflammatory responses[22]. Contrary to many other studies Andersen evaluated human response to 78 hour exposure to dry air and concluded that there is no physiological need for humidification of the air because no discomfort was reported from the body surfaces, and skin resistance did not change[23]. Togias found out that epithelial cell shedding accompanies clinical responses to cold dry air in the human nose[24]. This supports the hypothesis that the airway mucosa of cold dry air sensitive individuals can not compensate for the water loss that occurs under

extreme conditions leading to epithelial damage. Togias also worked on relationship between sensitivity to cold, dry air, hyperosmolal solutions, and histamine in the adult nose and suggested that cold dry air responders may have increased nasal mast cell releasability to hypertonic stimuli but their end-organ reactivity is not enhanced[25].

We suggest further studies on the same subject with in depth symptom analysis. Likewise molecular level and microscopic research would be beneficial. Joint venture between medical and environmental experts are going to be extremely beneficial to evaluate these climatic effects on human body.

CONCLUSION:

Effects of exposure of dry air of air conditioners on nasal mucosa in terms of nasal itching and nasal bleeding were found to be significantly higher when subjects were exposed 15 hours or more per day. Nasal bleeding was more commonly seen in elderly subjects (more than 40 years) due to such exposure.

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