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To Study the Correlation Between Allergic Rhinitis and Respiratory Endurance in Children

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Abstract

As per recent studies, the prevalence of allergic rhinorrhea in children has increased to 25%. Allergic rhinitis is a disease of nasal obstruction or congestion that causes sneezing, nasal itching, runny or stuffy nose and sometimes reduction of sense of smell. Allergic rhinitis is challenging to handle. Physicians are reporting several cases of patients with severe symptoms. This research aims to study the correlation between allergic rhinitis and respiratory endurance in children. **Material and Methodology:** The random sample strategy was employed in this investigation. 50 individuals were chosen according to inclusion and exclusion standards. During this study, an incentive spirometer assessment was done on children. The collected data included demographic data and the assessment of an incentive spirometer. **Result:** According to the statistical analysis, there is a correlation between allergic rhinitis and respiratory endurance in children. This study shows that in children with allergic rhinitis, respiratory endurance is lower than the normal patients. **Conclusion:** This report found a correlation between allergic rhinitis and respiratory endurance in children.

Keywords: Age group, Allergic Rhinitis, Children, Correlation Respiratory Endurance

1. Introduction

The definition of rhinitis is applied to diseases of the nasal passages because of the anatomical reaction occurring with the paranasal sinus, middle ear, nasopharynx and disorders of the lower airways[1]. Allergic Rhinitis (AR) is the most commonly occurring disorder among people of all ages. It is caused by allergies which often peak during the teenage years[2].

Persistent AR is defined by signs and symptoms lasting longer than 4 days or weeks or greater than consecutive weeks[3] in children who suffer from allergic rhinitis frequently[4]. AR is a common global health problem and individuals suffering from AR are more prone to chronic diseases[5]. Atopic diseases like allergic rhinoconjunctivitis, asthma, atopic dermatitis and some food allergies which tend to run in families can cause AR in patients[6]. AR is an allergen and inflammation of nasal mucosa is often linked to coexisting medical conditions[7]. Symptoms of AR are nasal obstruction or congestion, sneezing, nasal itching, runny or stuffy nose, and sometimes reduction of sense of smell[3]. Patients with AR have the worst allergy symptoms and feel tired, miserable and very irritable[8]. In AR, 45% of the children suffer from disturbance of sleep because of nasal AR symptoms[8]. In AR, typical immediate symptoms occur in such individuals, including oral and pharyngeal hypersensitivity (itching, tingling, erythema, angioedema of tongue, lip and soft palate[9]).

AR patients are challenging to treat[10] as most patients approach their physicians with either mild or severe symptoms[11]. In AR patients, nasal and symptoms of the eyes are linked to early and late response and it can hurt the quality of life and daily living functions of patients[12,13]. AR is most closely linked to additional inflammatory

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conditions that affect the respiratory mucous membrane, such as asthma, rhino sinusitis and allergic conjunctivitis[14]. AR patients may be unable to participate in family or social functions or events, resulting in emotional disturbances, sadness, anger, and withdrawal[15]. Rhinitis is a chronic nasal inflammation disease. It can be identified by its nasal obstruction, rhinorrhoea, sneezing and nasal itching, which become relevant because of its high prevalence and causing discomfort to patients.[16,17]. AR is a mostly ignored, underdiagnosed, misdiagnosed and mistreated disease[18].

In adolescents, AR prevalence is 28.0%. The frequency of allergic rhinorrhea is age-related and paediatric non-allergic rhinitis which is present with symptoms of chronic rhinitis is not well-defined[19]. The frequency of AR is very high[20] as several atopic diseases can also cause AR[21]. AR occurs in all areas of daily living, work and school[20,21]. AR patients also suffer from a socio-economic burden[22,23].

AR is not a serious illness but because it lies at the root of many complications, it is clinically relevant[9]. Due to rhinitis caused by allergies, children face difficulties at school like learning impairment, distraction, fatigue, poor sleep or irritability[9]. Patients suffer from AR because it harms work and productivity of daily living activities. It may lead to chronic diseases such as diabetes and heart disease[24]. Nowadays, many treatments are available with leukotriene, oral steroids and Intranasal Corticosteroids (INS)[25,26]. In AR patients, a large number of the key pathophysiological mediators such as histamine, cytokines, prostaglandins and leukotriene are present. They play a role in sleep regulation, independent of nasal obstruction and might be directly involved in their feature condition[27].

Patient education is most important in AR. Patients should be educated about matters related to AR diseases, in addition to addressing the safety of the treatment modalities used and the likelihood of disease progression. The patient needs to be informed about aggravating factors in terms of nasal symptoms because avoidance could alleviate them[9].

2. Method

This study assessed how AR is correlated with respiratory endurance in children. In this study, participants comprised individuals suffering from AR, affected and unaffected patients. This research was carried out using the help of a spirometer assessment on a data collection sheet. Certification was extracted from the protocol committee. Permission was taken from the authorities and the Ethical Committee for further procedures. A data collection sheet that included demographic data such as name, age, gender, BMI and contact number, followed by consent. Following the inclusion and exclusion standards for AR, child participants were selected. The procedure was explained to the participants, informed consent was taken and a data sheet was collected. It was recommended that patients should be in a comfortable position to support the incentive spirometer in a proper upright position. The patients were encouraged to take a deep and slow breath or inhale through the mouth to achieve a certain volume depending on the patient's age and height. The patients were given instructions regarding the breath-holding time. The breath is held for at least 2 to 3 seconds, at a minimum, with full inspiration. During the period of the expiration, it is done slowly and calmly with lips no longer closed around the mouthpiece. Patients were given three repetitions at the time of the assessment and the score was recorded. The total average of the spirometer score of inspiration was taken. Based on the data gathered, statistical analysis and the analysis of corrections were done.

2.1 Inclusion Criteria

- Boys and girls diagnosed with AR by a doctor.

2.2 Exclusion Criteria

- Subject with a history of lung infection.
- Subject with asthma.

2.3 Outcome Measure

A spirometer was used for assessing the respiratory endurance of AR patients, Franklin E *et al*.

3. Result

Among the 50 subjects in this study, 25 subjects were enrolled in a group of affected and unaffected patients with allergic rhinitis.

Table 1. Age distribution of affected and unaffected Patients

Age	Count of Affected Patients	Count of Unaffected Patients
5-10 Years	14 (28%)	4 (8%)
11-15 Years	11 (22%)	21(42%)

This table shows the count and percentage of children affected with AR according to age groups of 5-10 and 11-15 years as well as unaffected children.

The count and percentage of affected patients in the age group of 5-10 years is 14 (28%), and in the age group 11-15 years is 11 (22%). The count of unaffected patients in the age groups of 5-10 years is 4 (8%) and for age 11-15 years is 21 (42%).

Table 2 shows the count of gender, male and female according to Group A Affected and Group B Unaffected.

Table 3 shows the count and duration of the patients suffering from AR. It shows how many children were affected in that particular duration.

Table 4 shows patients affected with AR (Group A) and unaffected patients (Group B).

According to the spirometer reading the mean and SD values were calculated for Group A and Group B.

The mean and SD value of age group 5-15 years children (Group A) participants was 1466.66 ± 577.3, and the mean of Group B was 3142.66 ± 964.49. The p-value of affected patients in group A <0.0001 and T value is 12.702.

The P value of unaffected patients was <0.0001 and the T value of group B was 16.292.

Table 2. Distribution of gender in Group A and B by affected and unaffected status

Gender	Group A Affected	Group B Unaffected
Male	12(24%)	14(28%)
Female	13(26%)	11(22%)

Table 3. Duration of allergic rhinitis and count of affected patients

Duration of the Patients Suffering from Allergic Rhinitis.	Count of Affected Patients
1-3 Months	4
4-6 Months	6
7-10 Months	5
10 Months-2 Years	10

Table 4. Comparison of mean values between Group A and B.

Groups	Mean ± SD	P Value	T Value
Group A	1466.66 ± 577.3	<0.0001	12.702
Group B	3142.66 ± 964.9	<0.0001	16.292

On comparing both the groups, the result shows that the mean and SD values of Group A is less than the mean and SD value of Group B.

4. Discussion

The present study aimed to find a correlation between AR in respiratory endurance in children. The participants in this study were the patients who were suffering from AR. The study shows that the prevalence of AR increased in children between 5 to 15 years of age. This study correlates with the study of Turner PJ *et al*. The previous study shows that the prevalence of AR is increasing and it affects 10% to 40% of children worldwide. Soyoung Hong *et al*., in their study showed the prevalence of AR in children was 49.5%[1]. In the present study for children, BMI was taken into consideration because the relevance of obesity was found in some patients suffering from AR as proved by Huang Yang *et al*. The study reported a strong relationship between AR and obesity in children. Giovanni Ciprandi *et al*., showed that there was a probable correlation between AR and body mass index and a change in functional indices[2]. Nourane Azab, Ibrahim I EI-Mahallaway *et al*. The previous study showed that respiratory endurance was lower in AR patients as their respiratory muscle strength was decreased. Frequent respiratory infections cause fatigue in the respiratory muscles. Previous studies were done in the same age group in individuals with AR and in this age group, AR is more seen in children. K.H. Carlsen *et al*. in their study showed that in the patients with AR, bronchial hyper-responsiveness changes occur. The present study showed that respiratory endurance was decreased in children with AR. Ribeiro EC *et al*. in their study showed that patients affected with AR suffer from sleep disturbance and other quality-of-life difficulties. Eli O Meltzer *et al*., in their study showed that health-related quality of life AR can cause measure impairment[4].

In the present study, many AR patients were found with nasal obstructions. De-Yun Wang *et al*., show that nasal obstruction is a cardinal symptom of AR. At the time of AR, many inflammatory and neurogenic mediators are released and they can cause plasma exudation and vasodilation with swelling and oedema of the nasal mucosa[5].

Children are more likely to get AR as they become older. Children aged 5 to 15 are becoming increasingly more affected by AR. Given that those children have

reduced respiratory endurance, this study should help them to manage AR better.

5. Limitation

The study was conducted at rural and city levels, therefore generalisation of the study may be limited. Another study limitation was the reduced sample size. At the time of the study or assessment, patient education was needed regarding how to use the assessment device i.e. spirometer.

6. Conclusion

According to the findings of this study, there is a high prevalence of AR in children. The study shows that there is a correlation between AR and respiratory endurance. In affected patients, respiratory endurance is less compared to the unaffected patients.

7. Future scope

This study can be performed on a larger population and in different age groups. Similar studies can be performed by studying the impact of AR on other body systems and the quality of life of patients. This study can be made more precise with more details. The above-mentioned suggestions and recommendations can be considered for future scope.

8. Summary

The study shows that the prevalence of AR is higher in children. The study concluded that there is a correlation between AR and respiratory endurance in children. In this study sample sizes were taken at 50 and an incentive spirometer assessment was conducted in affected as well as unaffected patients to find out the respiratory endurance. The assessment was repeated thrice in affected and unaffected patients. In this sample size, affected patients included 12 boys and 13 girls and unaffected patients included 14 boys and 11 girls. This study was done according to age groups of 5 to 15 years. Statistical analysis was done, calculating the values of Mean SD, p and T values and an average of all the repetitions in both the groups. These show that the T value of affected patients is less than the total of unaffected patients.

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