

A study to Findout the Effect of Diaphragmatic Breathing on Lung Function in Individuals with Allergic Rhinitis.

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AIM and OBJECTIVE

To find out the influence of diaphragmatic breathing exercises on lung function in individuals with allergic rhinitis.

Background

Nasal obstruction and mouth breathing have an impact on respiratory muscle behavior, leading to changes in their power.

Patients and methods This study included 80 adult patients aged 20–45 years with already diagnosed allergic rhinitis. Overall 80 patients met the criteria for participation. The study population was randomly divided into two groups of 40 each. Group A was treated with IntraNasalSpray (INS) spray fluticasone propionate (FP) twice daily in both nostrils and group B with INS spray and DBE after the spray.

Results On evaluation of individual symptoms (sneezing, itching of eyes and nose, nasal obstruction and nasal discharge) before and after treatment, both groups showed improvement of symptoms after treatment (Fig. 1). The difference in individual symptom improvement post treatment exhibited a statistical significance in group B

Conclusion Our data indicate that the combination treatment of DBE and INS offers a statistical advantage over treatment with the intranasal steroid FP for AR. Hence DBE is a simple and cost effective measure to reduce symptoms of AR and improve patient satisfaction. Breathing exercise is simple, economical and easy method available to improve the lung function and chest excursion in allergic rhinitis.

Keywords:

Allergic Rhinitis(AR), Diaphragmatic Breathing exercises(DBE), Intra Nasal Spray(INS), Lung Function.

INTRODUCTION

Allergic rhinitis is an inflammatory response of the nasal mucosa arising from an abnormal hypersensitivity immune response to normally harmless and ubiquitous environmental allergens. It is characterized by symptoms like sneezing, running nose, itchy throat, watery red eyes. It can be seasonal or perennial. Allergic rhinitis (AR) is a common health problem that leads to frequent visits to primary care physicians and to ear, nose and throat specialists. It contributes to a significant amount of health care expenditure due to direct costs arising from physician visits, as well as indirect costs related to missed days at work and a general loss of productivity due to a decrease in life-quality of those affected [1–4]. AR is a global health problem that affects patients of all ages and ethnic groups with an estimated prevalence of 30% in the general population [5]. AR treatment includes allergen avoidance, pharmacotherapy and immunotherapy. Intranasal corticosteroids (INS) are recommended as first-line therapy for patients with moderate-to-severe disease, especially when nasal congestion is a major component of symptoms [6].

Due to the chronicity of disease and the variable response to therapy, a large number of patients resort to complimentary and alternate medication for AR. Our aim of the study was to identify the efficacy of Diaphragmatic

breathing exercises (DBE) in patients of AR.

METHODS AND METHODOLOGY

Study design : prospective experimental design

Sample size : 80 subjects (40 subjects in group A and 40 in group B.)

Study setting: Vaagdevi Physiotherapy and Paediatric rehabilitation centre.

Inclusion criteria:

- Individuals with allergic rhinitis
- Individuals between 20 to 45 years of age
- Both males and females were included.

Exclusion criteria:

- Obstructive and restrictive lung disease
- Cardiac disease.
- Musculoskeletal, Neurological, endocrinal disorder.
- Pregnancy
- Lactation
- Significant psychological problems
- Systemic nasal and Para nasal surgeries
- Topical steroids, antihistamines, decongestants, or cromolyn in the preceding 2 weeks or immunotherapy in the last 2 years.

Duration of the study: 30 repetitions 3times per day. Every day for 12 weeks.

Purpose of the study

Frequent upper respiratory illness is a common problem in children and adolescence. About 80% of all patients with allergic rhinitis have symptoms between 20 to 45 years of age.

Allergic rhinitis can be caused by allergic, non allergic infections, hormonal occupational and other factors.

Allergic rhinitis is usually accompanied with diminished lung function. Former is a common and troublesome. Later it causes severe morbidity and mortality affecting the quality of life if patient doesnot receive proper treatment.

Purpose of the study is to find out the effectiveness of diaphragmatic breathing exercises in allergic rhinitis.

Methodology

Overall 80 patients met the criteria for participation. The study population was randomly divided into two groups of 40 each. Group A was treated with INS spray fluticasone propionate (FP) twice daily in both nostrils and group B with INS spray and DBE after the spray.To have uniformity in the procedure the DBE was demonstrated to the patient and the same was repeated by the patient in front of the examiner. The exercise in this study is deep inspiration followed by expiration The exercise was repeated 30 times each day after INS spray by the patients of group B.

Each patient recorded symptom scores in a diary once a day. Subjects reported sneezing, rhinorrhea, nasal congestion, and itching on a four-point verbal descriptor scale.

0	Never	No problem
1	Rarely	Problem present but not disturbing
2	Quite often	Hampering any activity or sleep
3	Very often	Problem hampering some activities or sleep

A total symptom score was calculated daily for each symptom and the monthly score was evaluated for a period of 3 months after treatment. The individual symptom as well as total symptom scores before treatment was compared with scores after treatment for statistical significance.

Data was tabulated in excel worksheet and statistical analysis performed by SPSS 18. Descriptive analysis was performed and analytical statistics performed by independent sample t test. $P < 0.05$ was considered statistically significant.

Results

The study included 80 patients out of which seven patients of group A and four patients of group B were lost to follow up during the 3 months post treatment. Hence a computer generated random sample of 30 patients was taken in each group for further statistical evaluation. Group A consisted of 30 patients with a mean age of 30.7 years and group B included 30 patients with a mean age of 32.4 years

Sneezing and nasal discharge was the commonest symptoms in both the groups (Table 1). On evaluation of the symptom score before treatment, group A had a mean score of 5.100 (SD 1.34805, SE 0.24612) and group B had a mean score of 5.200 (SD 1.60602, SE 0.29322). The mean difference was 0.100 (SE diff. 0.3828, 95% CI 0.6663–0.8663) which was not found to be statistically significant ($P = 0.795$).

On comparing the symptom scores of group A and B before and after treatment it was seen that the mean scores after treatment for group A was 3.8333 (SD 2.4223, SE 0.4422) and for group B was 2.6667 (SD 1.6470, SE 0.3007). The mean difference after treatment for group A was 1.2666 (SE diff. 0.5061, 95% CI 0.2457–2.2858) and for group B was 2.5333 (SE diff. 0.420, 95% CI 1.6926–3.3740). The difference in pre and post treatment symptom scores were found to be statistically significant (P value group A = 0.016 and P value group B = 0.000).

We also compared the symptom scores post treatment between both the groups to find the mean difference of 1.1666 (SE diff. 0.5348, 95% CI 0.0961–2.2371) which was also statistically significant ($P = 0.033$).

On evaluation of individual symptoms (sneezing, itching of eyes and nose, nasal obstruction and nasal discharge) before and after treatment, both groups showed improvement of symptoms after treatment (Fig. 1). The difference in individual symptom improvement post treatment exhibited a statistical significance in group B (Table 2).

Discussion

AR is an upper airway disease that's caused by an IgE-mediated inflammatory reaction after allergen exposure, and it could contribute to decreased social activity, a poor quality of school life and decreased productivity in moderate-to-severe symptomatic patients [2–4].

AR is a highly prevalent disease, with a large economic burden on the state due to the direct and indirect costs

associated with this disease. Direct costs relate to use of various medication for AR whereas indirect costs are Table 1 Number of patients with symptoms in group A and B before and after treatment

Symptoms	Group A (n = 30)		Group B (n = 30)	
	Before (%)	After (%)	Before (%)	After (%)
Sneezing	25 (83.3)	21 (70)	27 (90)	20 (66.6)
Itching	17 (56.6)	13 (43.3)	20 (66.6)	11 (36.6)
Nasal obstruction	20 (66.6)	18 (60)	18 (60)	9 (30)
Nasal discharge	22 (73.3)	18 (60)	21 (70)	14 (46.6)

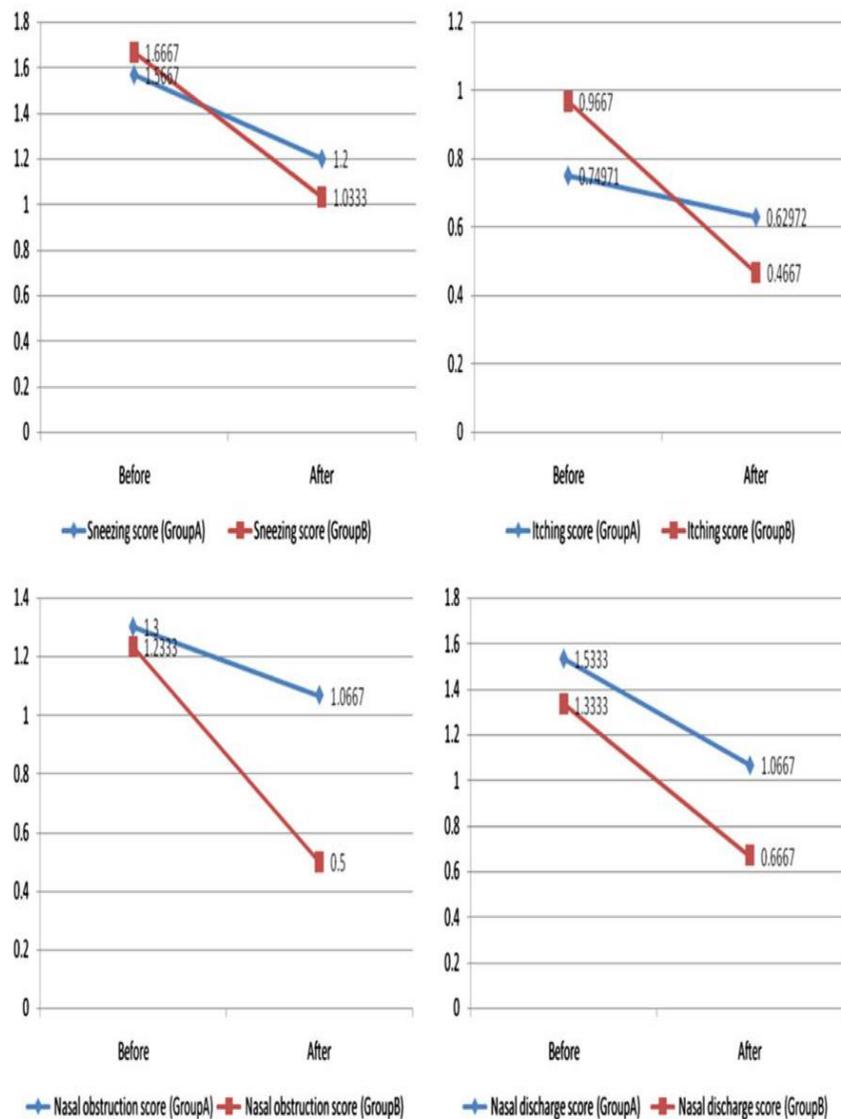


Table 2 Difference in symptom scores for individual symptoms after treatment

Symptoms	Group A				Group B			
	Mean diff.	SE diff.	CI	P	Mean diff.	SE diff.	CI	P
Sneezing	0.3666	0.2495	0.1328–0.8661	0.147	0.6333	0.2339	0.1649–1.1017	0.009
Itching	0.2000	0.1787	0.1578–0.5578	0.268	0.5000	0.2046	0.0903–0.9096	0.018
Nasal obstruction	0.2333	0.2715	0.3103–0.7770	0.394	0.7333	0.2645	0.2029–1.2634	0.008
Nasal discharge	0.4666	0.2823	0.0984–1.03	0.104	0.6666	0.2521	0.1611–1.1721	0.011

SE diff. standard error of difference, CI 95% confidence interval, P level of significance

attributed to time lost from work and costs attributed to at-work productivity loss. In this era of limited health care economic resources, it is vitally important to distinguish which therapy for AR is most clinically effective and cost effective [2–4].

INS sprays, leukotriene receptor antagonists, nasal anti-cholinergics, and immunotherapy. INS are recommended as first-line therapy especially when nasal congestion is a major component of symptoms. The major advantage of INS administration is that high concentrations of the drug, with rapid onset of action, can be delivered directly into the target organ, so that systemic effects are avoided or minimized.

FP is the first of a third generation of inhaled steroid. It has less potential for systemic adverse effects because it is very poorly absorbed in the gastrointestinal tract and is subject to extensive first-pass metabolism in the liver. Various studies have evaluated the efficacy of FP nasal spray and found it to be effective in the reduction of total nasal symptom score and total orbital symptom scores [7–9].

We used FP in our study and our results shows similar symptomatic efficacy for INS as studies in literature [7–9].

AR due to its chronic nature represents serious public health problem and need for medication on a long term basis. Though the side effects of long term use of medication for AR is minimal there is a fear among many patients of side effects of synthetic drugs. This fear influences many patients to seek complementary and alternative medicine (CAM). The literature suggests CAM use is high among rhinology patients (65%) [10].

The DBE used in this study is a simple procedure which is reproducible and can be performed easily. Due to its similarity to popular breathing exercise of yoga, the exercise could be easily explained to our study group and the patients had no reservations performing it. Though the study does not directly analyse the mechanism of DBE and its effects on AR, the author proposes a plausible explanation for the improvement in symptoms after DBE with the available literature on the subject. Various studies on nasal nitric oxide (nNO) in humans have revealed nitric oxide to be maximally produced from the nasal and paranasal sinus [11–13]. There have been an interesting analysis of humming and increased nNO as compared with normal quiet nasal exhalation suggesting improved paranasal sinus ventilation with this maneuver [14, 15]. Humming causes the air to oscillate, which in turn seems to increase the exchange of air between the sinuses and the nasal cavity. Though there are various studies in literature on the mechanism of improved ventilation of sinus, there are no studies which have evaluated the symptoms of AR and its

effects with breathing exercises. The author considers the effect of the DBE after INS leads to improved distribution of the medication in the nasal cavity and paranasal sinus which could have resulted in the significant improvement of the patient symptoms.

When the total symptom scores after treatment were examined, the mean score of patients in the DBE group was numerically lower than that of patients in the INS group, and the magnitude of the difference reached statistical significance. All the individual symptom scores of both groups were also reduced after treatment and NBE demonstrated a statistical superiority in the reduction of individual symptoms of AR. Perhaps a longer study would show larger differences between the treatment arms and individual symptoms. In summary, our data indicate that the combination treatment of DBE and INS offers a statistical advantage over treatment with the INS alone for AR.

Our study has both strengths and limitations. The strength of the study is the fact that we have provided the first study which has clinically compared the effects of NBE on symptoms of AR. The major confounding factor in the study is use of INS in both groups which could not be avoided as the institute ethical committee did not accept the use of only NBE with no medical treatment as a third group in this study. Nevertheless, our findings add to the current literature and hopefully pave the way to larger studies aimed at confirming the value of NBE which can lead to improved patient satisfaction and reduce direct and indirect cost of treatment of AR.

Conclusions

AR is a common and chronic health problem having a high prevalence in the population. The direct cost of treatment as well as indirect cost due to loss of productivity is significantly high in AR. Our data indicate that the combination treatment of DBE and INS offers a statistical advantage over treatment with the intranasal steroid FP for AR. Hence DBE is a simple and cost effective measure to reduce symptoms of AR and improve patient satisfaction.

Breathing exercise is simple, economical and easy method available to improve the lung function and chest excursion in allergic rhinitis.

Limitations of the study

The study results cannot be generalized to the whole Indian population as it was conducted on a very small group.

The improvement in intensity of symptoms was only subjective and it does not provide any clinical tests or objective quantification.

The changes or improvements documented are prone to be influenced by various other factors like psychological status of the patient,

Recommendations

The study can be conducted on a large sample to generalize the results.

Studying the long-term effects of these exercises is necessary.

Apart from documenting improvement in terms of decrease in intensity of symptoms, other factors like duration and frequency of symptoms and the number of symptoms appearing in the patients is to be studied.

Further study can be done to the effectiveness of this study protocol

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Conflicts of interest

There are no conflicts of interest.

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