

# Effects of Diaphragmatic Breathing Exercise Combined with Bhramari Pranayama on Improving Quality of Life in Patients with Chronic Rhinosinusitis: A Pre-Post Interventional Study

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## Abstract:

### ➤ Background:

Chronic rhinosinusitis is a long-lasting inflammatory disease which can have an impact on nasal symptoms, sleep, everyday activities and emotional well-being. The Sino-Nasal Outcome Test-22 is generally used for evaluating the extent of sinonasal symptoms and health-related quality of life. Breathing-based treatments, such as diaphragmatic breathing and Bhramari pranayama, might help with respiratory control and relaxation; yet there is still limited evidence regarding their combined application in chronic rhinosinusitis.

### ➤ Aim:

To evaluate the changes in the Sino-Nasal Outcome Test-22 scores in adults suffering from chronic rhinosinusitis as a result of a programme that involves combined diaphragmatic breathing and Bhramari pranayama.

### ➤ Methods:

The study was a single-group pre-post interventional study involving 58 people aged between 21 and 44 years who had chronic rhinosinusitis. The participants were recruited through convenience sampling in Jalgaon, Maharashtra. Health-related quality of life was evaluated both before and after the intervention with the use of the 22-item Sino-Nasal Outcome Test. The intervention consisted of diaphragmatic breathing and Bhramari pranayama, and the pre- and post-intervention scores were compared using a paired-samples t-test.

### ➤ Results:

The average score before the intervention was 47.33 and the standard deviation was 11.28; after the intervention the average score was 30.57 and the standard deviation 9.82. The mean decrease was 16.76 points with a standard deviation of 6.91. The paired-samples t-test revealed a statistically significant difference between the pre-intervention and post-intervention scores, the t value being 18.474 and the degrees of freedom 57, and the p value was less than 0.001. The thesis states that 48 participants, which is 82.8 per cent, had an improvement of at least 12 points.

### ➤ Conclusion:

The participants of Sino-Nasal Outcome Test-22 scores were reduced as a result of the combined breathing programme. However, since the study involved only one group without including a control group, the changes cannot be solely attributed to the intervention and further controlled studies are required to verify these results.

**Keywords:** Chronic Rhinosinusitis; Diaphragmatic Breathing; Bhramari Pranayama; Quality of Life; Sino-Nasal Outcome Test-22.

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## I. INTRODUCTION

Chronic rhinosinusitis (CRS) is a long-standing inflammatory disease of the mucous membrane in the nose and the paranasal sinuses, and is generally characterised by symptoms that last for at least 12 weeks. It can cause nasal blockage, discharge, a feeling of pressure in the face, sleep disturbance, fatigue and a decrease in everyday functioning. The effects of the condition go beyond the local sinonasal symptoms and can have an effect on health-related quality of life [1,2].

The Sino-Nasal Outcome Test (SNOT-22), which consists of 22 items, is a measure based on patients' own reports and is used for assessing symptoms relating to the sinuses and the associated problems concerning quality of life. The test has questions that address nasal symptoms, as well as those affecting the ears and face, sleep, function and emotional effects. Each item is assigned a score ranging from zero to five, the total score thus varying from zero to 110; a higher score shows a greater degree of symptoms and a lower level of health-related quality of life [2]. It has been suggested that a decrease of about 12 points represents the minimal clinically important difference in cases of CRS that are medically managed, although interpretation should take into account the particular population and clinical situation [3,4].

Diaphragmatic breathing is a technique which focuses on the movement of the diaphragm and on the expansion of the abdomen when inhaling. A narrative review outlines the possible effects of diaphragmatic breathing on health and on physiological regulation, although the evidence differs among clinical populations [5]. Slow breathing has likewise been linked to autonomic and psychological reactions, including those related to relaxation [6]. While these findings offer a general basis for investigating controlled breathing, they do not prove a specific effect on CRS.

Bhramari pranayama is a breathing technique used in yoga which includes making a humming sound when exhaling. A study carried out by Abishek and his colleagues looked into Bhramari pranayama in individuals with CRS and found that their SNOT-22 scores improved when the practice was combined with conventional treatment [7]. Furthermore, reviews have also examined the possible health effects of Bhramari pranayama, although the mechanisms involved and the strength of the evidence are still being investigated [8].

The SNOT-22 scores before and after the intervention were therefore evaluated in patients with CRS who received a combined programme of diaphragmatic breathing and Bhramari pranayama; since both techniques were given together, the study is not able to estimate the individual contribution of either technique.

## II. MATERIAL AND METHODOLOGY

### ➤ Study Design and Setting

A single-group pre-post interventional study was conducted in Jalgaon, Maharashtra, India. The thesis reports a study duration of six months and a sample of 58 participants. Participants were recruited using convenience sampling.

### ➤ Participants

Eligible participants were male or female adults aged 21 to 44 years with a clinical diagnosis of CRS made by an ear, nose and throat specialist or rhinologist and symptoms lasting at least 12 weeks. Participants had to provide informed consent, understand the instructions and be medically stable for the breathing programme.

Exclusion criteria included acute exacerbation or acute nasal/sinus infection at assessment; recent nasal or sinus surgery or a need for immediate surgery; major cardiovascular, pulmonary, renal, metabolic or neurological disorders that could interfere with participation; malignancy or serious systemic illness; pregnancy; current smoking or significant tobacco exposure; regular practice of Bhramari pranayama, structured breathing exercises or yoga; inability to perform the exercises safely; or unwillingness or inability to complete.

### ➤ Intervention

The intervention involved diaphragmatic breathing and Bhramari pranayama. For the first technique, the participants were asked to adopt a comfortable position for supported sitting or semi-Fowler's position, with one hand on the chest and the other one on the abdomen. They had to inhale through the nose slowly and allow the abdomen to rise with little movements of the chest and hold the breath for about 3 seconds and slowly exhale through the mouth for 5 seconds. The thesis reports three sets of three minutes each with two-minute rest intervals in between and twice-a-day practice for five days a week for eight weeks. Meanwhile, Bhramari pranayama was practiced by sitting comfortably with the erect spine and taking a few breaths in and out. The participants had to inhale through the nose and then slowly exhale while humming with their lips closed. The ear/tragus occlusion during the humming was described as optional. The protocol recommended that the practitioners should practice for about five to ten minutes twice a day, once in the morning and once in the evening.

### ➤ Statistical Analysis

Descriptive statistics were reported as means and standard deviations for continuous variables and frequencies and percentages for categorical variables. The thesis reports use of PSPP or JASP software, a paired-samples t-test to compare pre-intervention and post-intervention SNOT-22 scores.

### III. RESULT

Table 1 Gender Wise Group Distribution

| Gender | n  | Percentage |
|--------|----|------------|
| Male   | 22 | 37.9%      |
| Female | 36 | 62.1%      |
| Total  | 58 | 100%       |

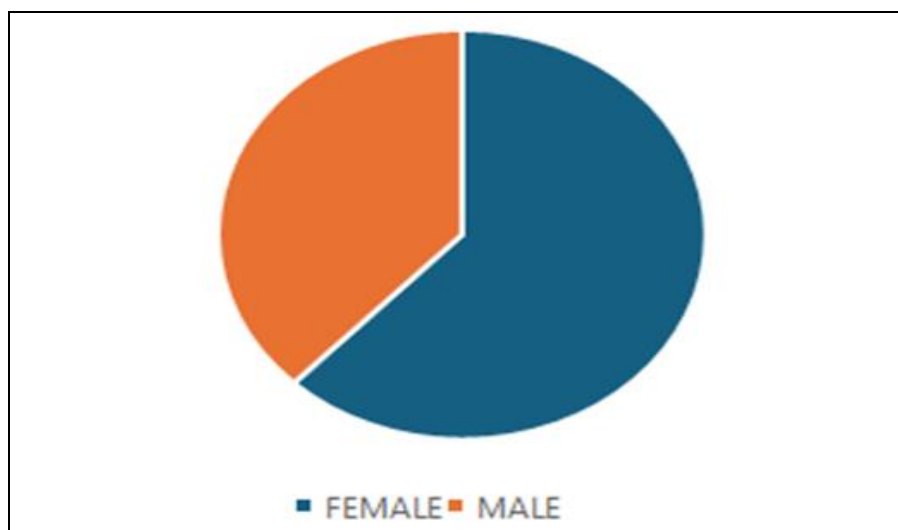


Fig 1 Gender Wise Group Distribution

Table 2 Age Wise Distribution

| Variable    | Result             |
|-------------|--------------------|
| Mean SD     | 32.34 ± 6.32 years |
| Median      | 31.5               |
| Minimum age | 21                 |
| Maximum age | 44                 |
| Age range   | 21- 44             |
| Total       | 58                 |

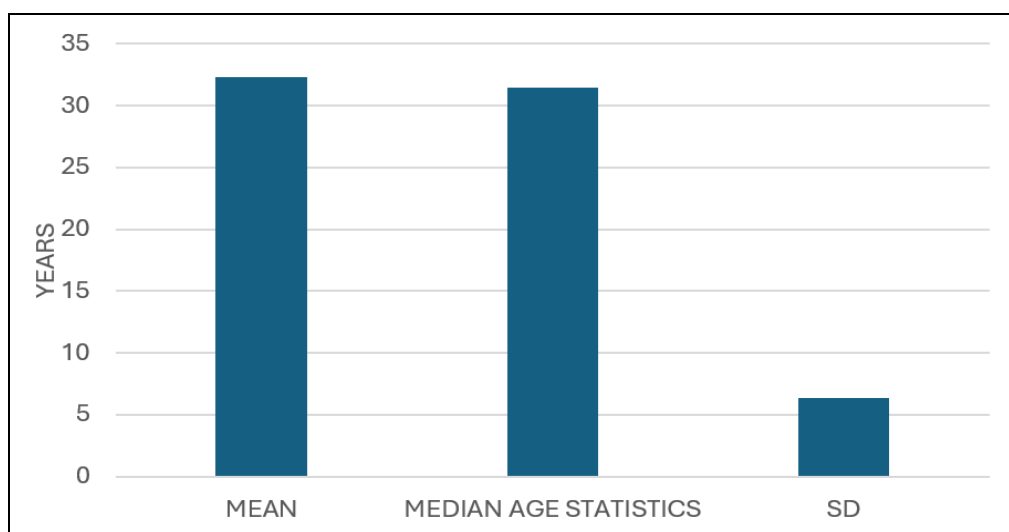


Fig 2 Age Wise Distribution

Table 3 Pre and Post Intervention SNOT-22 Scores

| Variables               | No. | Mean SD       | Median | Minimum | Maximum |
|-------------------------|-----|---------------|--------|---------|---------|
| Pre-Intervention score  | 58  | 47.33 ± 11.28 | 49.5   | 16      | 71      |
| Post-intervention score | 58  | 30.57 ± 9.82  | 31     | 7       | 48      |
| Improvement (Pre-Post)  | 58  | 16.76 ± 6.91  | 16.0   | 4       | 33      |

Table 4 Paired- Samples T-Test : Pre-Test vs Post-Test

| Test    | Mean  | SD   | P-value |
|---------|-------|------|---------|
| Overall | 16.76 | 6.91 | <0.001  |

Table 5 Clinical Significance According to SNOT-22 MCID

| Clinical Improvement | n  | %    |
|----------------------|----|------|
| ≥12                  | 48 | 82.8 |
| <12                  | 10 | 17.2 |
| Total                | 58 | 100  |

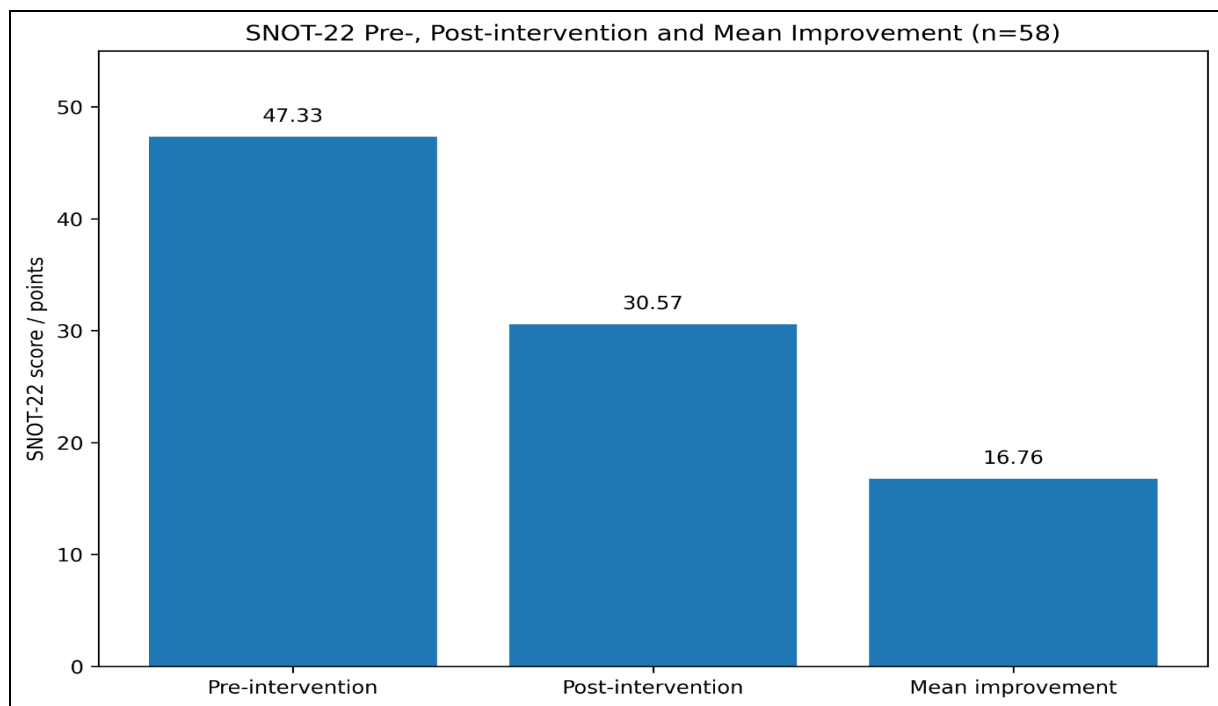


Fig 3 Pre and Post Intervention SNOT-22 Scores

#### IV. DISCUSSION

The present study aimed to assess the efficacy of diaphragmatic breathing and Bhramari pranayama for improving the quality of life in patients with chronic rhinosinusitis. The study used the SNOT-22 score as an outcome measure. The mean score changed from  $47.33 \pm 11.28$  prior to intervention to  $30.57 \pm 9.82$  after intervention, which suggests that the quality of life has significantly improved by  $16.76 \pm 6.91$  points following the intervention. The paired-samples t-test showed that the changes were statistically significant,  $t(57) = 18.474$ ,  $p < 0.001$ , with a 95% CI = 14.94 to 18.58 Cohen's  $d = 2.43$ .

The rationale for using these two techniques includes the ability of diaphragmatic breathing to promote the function of the respiratory system and reduce stress. Bhramari pranayama is associated with slowing down the breathing process and humming, which improves nitric oxide levels in the sinuses and facilitates better nasal breathing. Earlier studies provide conclusive evidence on the effectiveness of the intervention. For instance, Abishek et al. (2019) found that Bhramari pranayama improves SNOT-22 scores in patients with chronic rhinosinusitis. Zaccaro et al. (2018) expound on the physiological mechanisms of slow breathing, which have a calming effect

on the autonomous nervous system. Finally, Cai et al. (2024) found that breathing exercises improve pulmonary functions and the quality of life in patients with COPD.

Finally, the clinical meaning of the results can be evaluated using the threshold of a 12-point change on the SNOT-22 score, which indicates significant improvement. Out of the 58 participants, 48 (82.8%) improved by more than 12 points, whereas 10 (17.2%) improved by fewer than 12 points. Overall, the results suggest that the intervention leads to significantly improved quality of life following the intervention. However, the study's limitation is that it did not include a control group, and both breathing techniques were combined, making it impossible to identify which method contributed to the observed effect.

#### V. CONCLUSION

The present study concluded that diaphragmatic breathing exercise combined with Bhramari Pranayama was effective in improving quality of life in patients with chronic sinusitis, as demonstrated by a significant reduction in SNOT-22 scores after the intervention ( $p < 0.001$ ). The mean improvement in SNOT-22 score was  $16.76 \pm 6.91$  points, with 82.8% of participants achieving clinically meaningful improvement.

## VI. LIMITATIONS

- The study had a single-group pre–post design without a control group.
- The study included a restricted age range (21–44 years).
- The combined intervention did not allow the individual effects of diaphragmatic breathing and Bhramari Pranayama to be determined separately

## FUTURE SCOPE

- Future studies can be conducted with a larger sample size and a control group to improve the strength and generalizability of the findings.
- Similar research can be carried out among different age groups and populations to determine whether the findings are applicable to a wider population.
- Studies with longer intervention periods and follow-up assessments can be conducted to determine the long-term effectiveness and maintenance of improvement.

## REFERENCES

- [1]. Hirsch AG, Stewart WF, Sundaresan AS, Young AJ, Kennedy TL, Greene JS, et al. Nasal and sinus symptoms and chronic rhinosinusitis in a population-based sample. *Allergy*. 2017;72(2):274-281.
- [2]. Phillips KM, Hoehle LP, Caradonna DS, Gray ST, Sedaghat AR. Minimal clinically important difference for the 22-item Sinonasal Outcome Test in medically managed patients with chronic rhinosinusitis. *Clin Otolaryngol*. 2018;43(5):1328-1334. doi:10.1111/coa.13177.
- [3]. Phillips KM, Houssein FA, Boeckermann LM, Singerman KW, Liu DT, Sedaghat AR. Multi-institutional minimal clinically important difference of the 22-item Sino-Nasal Outcome Test in medically managed chronic rhinosinusitis. *Rhinology*. 2021;59(6):552-559. doi:10.4193/Rhin21.253.
- [4]. Singerman KW, Phillips KM, Sedaghat AR. Minimal clinically important difference for subdomains of the 22-item Sino-Nasal Outcome Test in medically managed chronic rhinosinusitis patients. *Int Forum Allergy Rhinol*. 2022;12(9):1196-1199. doi:10.1002/alr.22967.
- [5]. Hamasaki H. Effects of diaphragmatic breathing on health: a narrative review. *Medicines (Basel)*. 2020;7(10):65. doi:10.3390/medicines7100065.
- [6]. Zaccaro A, Piarulli A, Laurino M, Garbella E, Menicucci D, Neri B, et al. How breath-control can change your life: a systematic review on psycho-physiological correlates of slow breathing. *Front Hum Neurosci*. 2018;12:353. doi:10.3389/fnhum.2018.00353.
- [7]. Abishek K, Bakshi SS, Bhavanani AB. The efficacy of yogic breathing exercise Bhramari pranayama in relieving symptoms of chronic rhinosinusitis. *Int J Yoga*. 2019;12. [Complete page range and DOI should be verified from the published article before submission.]

- [8]. Chetry D, Chhetri A, Rajak DK, Rathore V, Gupta A. Exploring the health benefits of Bhramari pranayama (humming bee breathing): a comprehensive literature review. *Indian J Physiol Pharmacol*. 2024;68:71-85. doi:10.25259/IJPP\_325\_2023.