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Effectiveness Of Nasal Cycle Breathing And Sinus Mobiliztaion Technique In Subject With Sinusitis

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ABSTRACT

Background: This study investigates the combined effectiveness of Nasal Cycle Breathing (NCB)and Sinus Mobilization Techniques (SMT) in individuals with sinusitis, a common condition characterized by inflammation of the sinuses, leading to symptoms like nasal congestion, facial pain, and difficulty breathing. Traditional treatments, including antibiotics and corticosteroids, may have limited effectiveness, especially in chronic cases. NCB, which involves alternating nostril breathing to regulate nasal airflow, and SMT, a physical therapy technique targeting sinus drainage, offer promising non-invasive alternatives for managing sinusitis.

Aim: The aim of this study was to assess the impact of these methods on reducing symptoms, improving sinus ventilation, and enhancing overall nasal function.

Objective: The objectives included evaluating the effect of NCB on nasal airflow, the effectiveness of SMT in alleviating sinus pressure, and comparing results to standard medical treatment.

Method: The study involved 40 participants with chronic or recurrent sinusitis, who were randomly assigned to either a treatment group receiving NCB and SMT receiving standard medical care.

Results: After four weeks of treatment, results showed a significant reduction in SNOT-22 scores, indicating improved symptoms of nasal congestion, facial pain, and headache.

Conclusion: These findings suggest that combining NCB and SMT with conventional treatment is a promising adjunctive therapy for managing sinusitis, offering a non-pharmacological approach to symptom relief and improved sinus health.

Keywords: *Sinusitis, Nasal Cycle Breathing, Sinus Mobilization Techniques, Chronic Sinusitis, Nasal Airflow, Sinus Pressure.*

1. INTRODUCTION

Sinusitis is an inflammation of the paranasal sinus cavities that can cause debilitating symptoms such as nasal congestion, facial pain or pressure, headache, and even difficulty breathing. As a result, it is one of the most common conditions with a significant impact on quality of life. Although pharmaceutical therapy remains the mainstay, nonpharmacological therapies have emerged as viable alternatives.

Nasal cycle breathing and sinus mobilization are two strategies that may help people with chronic sinusitis enhance their sinus functions. [3] Sinusitis is a frequent chronic condition with significant health-care implications. This review focuses on

the elements that contribute to sinusitis pathogenesis and chronicity, such as anatomical features, mucociliary clearance abnormalities, microbial infections, and inflammation. In chronic sinusitis, inflammation is classified as "infectious" or "non-infectious". The inflammatory features of non-infectious inflammation are predominantly examined in the setting of chronic hyperplastic sinusitis with nasal polyposis. [4] At the different phases of the nasal cycle, the airflow inside the nasal cavity exhibits different patterns. The condition of the presence of the nasal cycle is a necessary condition to successfully regulate the respiratory airflow and is also the very reason why normal people do not feel nasal congestion. [1]

Nasal cycle breathing is the cycle of congestion and decongestion of one nostril that allows for the management of airflow to the sinuses and drainage, which is a natural process. [1] At any given instant in time, the airflow through one nostril is larger than the next, which then changes to the other. This is referred to as the nasal cycle. The nasal cycle lasts 30 minutes to 2-3 hours. Kayser, a well-known rhinologist, defines the nasal cycle as the alternating congestion and decongestion response of erectile tissue in the nasal turbinate and septum of two nostrils, which effectively altered the unilateral nasal resistance and was present due to prevailing sympathetic or parasympathetic tone. Sympathetic vasoconstriction reduces air resistance, enabling more air to pass through, whereas parasympathetic vasodilation increases nose resistance, reducing air flow. Sinus mobilization is the physical manipulation of the sinuses to facilitate evacuation and hence relieve sinus congestion. This paper investigates the possible effect of combining these treatments on symptom relief and sinus function in a patient with chronic sinusitis. [4]

2. METHODOLOGY

This quasi-experimental study will follow a pre-test and post-test design to evaluate the effectiveness of nasal cycle breathing and sinus mobilization techniques in individuals with chronic sinusitis. Conducted at Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth, Puducherry, the study will involve a total of 40 participants. Each participant will undergo a 4-week intervention consisting of both nasal cycle breathing exercises and sinus mobilization techniques. Baseline assessments will be conducted before the intervention to measure symptom severity, nasal airflow, and sinus function. Following the completion of the intervention, a post-test assessment will be carried out to evaluate any improvements in symptoms and overall sinus function. Participants will be allocated into groups using the odd-or-even method to ensure balanced distribution. This study aims to provide valuable insights into non-invasive therapeutic approaches for managing chronic sinusitis.

SELECTION CRITERIA:

Inclusion Criteria: The study will include adults aged 18 to 60 years who have been diagnosed with chronic sinusitis, characterized by symptoms persisting for more than 12 weeks. Participants must also be capable of performing nasal cycle breathing exercises as part of the intervention. **Exclusion Criteria**: Individuals with acute sinus infections or active nasal conditions unrelated to sinusitis will be excluded from the study. Additionally, those who have undergone previous sinus or nasal surgery, as well as pregnant or breastfeeding individuals, will not be eligible to participate. These criteria ensure a homogenous study population, allowing for accurate assessment of the intervention's effectiveness. The primary outcome measure of the study is symptom severity, which will be assessed using a validated sinusitis symptom score. The Sino-Nasal Outcome Test-22 (SNOT-22) will be used as the outcome tool to evaluate symptoms such as nasal congestion, facial pain, headache, and post-nasal drip. This standardized questionnaire provides a reliable assessment of the severity and impact of sinusitis on participants' daily lives, enabling a comprehensive evaluation of the intervention's effectiveness in improving sinus function and reducing symptoms.

DATA PROCEDURE:

The study follows a pre-post experimental design to assess the effectiveness of the Sinus Mobilization Technique (SMT) and Nasal Cycle Breathing (NCB) in individuals diagnosed with chronic or recurrent sinusitis using the **SNOT-22 questionnaire**. The SNOT-22 questionnaire, a 22-item self-reported outcome measure, assesses the physical, functional, and emotional effects of sinonasal symptoms. Each item is rated from 0 (no problem) to 5 (worst problem), for a total score range of 0 to 110, with higher scores indicating worse symptoms. Assessments are done at two times in time: before intervention (Day 0) and after intervention (4weeks). The intervention includes SMT and NCB. SMT is a type of manual therapy that focuses on the frontal, maxillary, ethmoid, and sphenoid sinuses. Specific techniques used include frontal sinus drainage with gentle downward pressure, maxillary sinus release with cheekbone mobilization, and ethmoid and sphenoid release with nasal bridge pressure and deep fascial stretching. This approach is used three times a week for 4-6 weeks, with each session lasting 15-20 minutes. NCB focuses on alternating nostril breathing to maintain proper airflow and sinus function. The technique consists of inhaling through one nostril while closing the other for 4-6 seconds, then switching nostrils and continuing for a total of 5 minutes every session. Over a four-week period, participants practiced NCB for 10 minutes each day.

3. STATISTICAL ANALYSIS

Data will be analysed using SPSS version 26.0. Descriptive statistics (mean, standard deviation) will be used to summarize participant demographics and baseline measurements. The effectiveness of the interventions will be assessed using paired t-

tests to compare pre- and post-intervention changes in nasal airflow, symptom severity (SNOT-22). A p-value < 0.05 will be considered statistically significant.

4. RESULT ANALYSIS

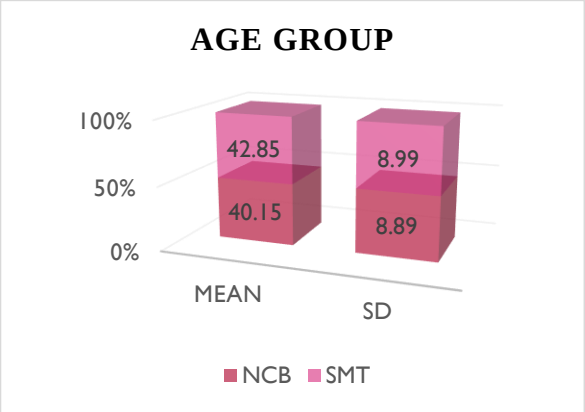
TABLE 1: DISTRIBUTION OF AGE AMONG GROUPS

S.NO	GROUP	N	MEAN	SD	p value	t value
1.	NCB	20	40.15	8.89	<0.0001	18.3801
2.	SMT	20	42.85	8.99		

Table.1: Distribution of Age

Table.1 shows the group statistics of age distribution among the 40 participants. The mean age of the 20 participants in group A was 40.15±8.89 and group B was 42.85±8.99. The p value shows <0.0001 and t value shows 18.3801.

Graph 1: Distribution of Age



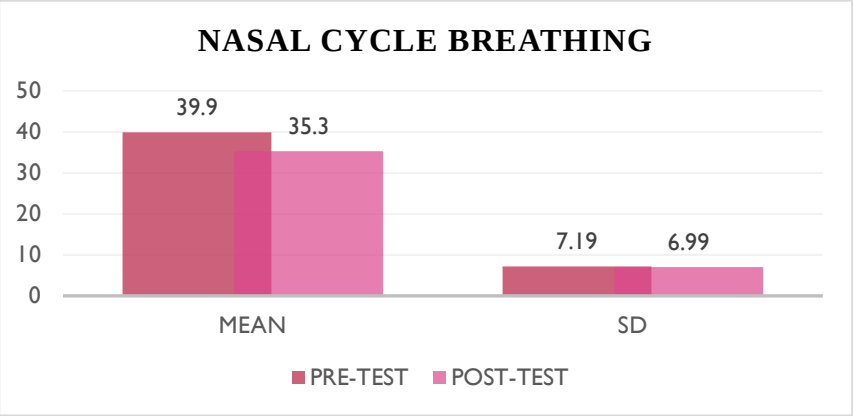
Graph 1 show that mean and standard deviation of the distribution of age.

TABLE 2: INTRA GROUP PRE-TEST AND POST -TEST OF SNOT-22 (GROUP A)

S.NO	NCB	N	MEAN	SD	p value	t value
1.	PRE-TEST	20	39.9	7.19	0.0472	-2.051
2.	POST-TEST	20	35.3	6.99		

Table.2: Analysis of intra group pre-test and post-test of SNOT-22 (Group A). The result shows there is a significant difference in pre and post value of SNOT-22

Graph 2: Pre and Post comparison of SNOT-22 (Group A)



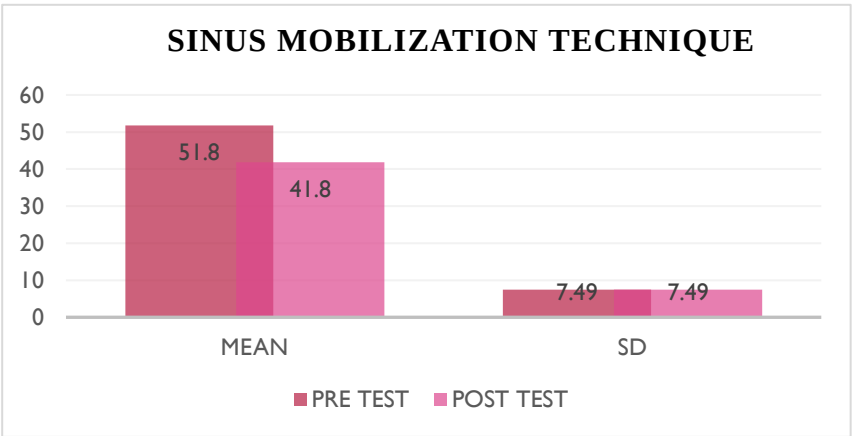
Graph 2 Shows that mean and standard deviation the SNOT-22 for Nasal cycle breathing

TABLE 3: INTRA GROUP PRE AND POST COMPARISON OF SNOT-22 (GROUP B)

S.NO	SMT	N	MEAN	SD	p value	t value
1.	PRE-TEST	20	51.8	7.49	0.0001	-4.222
2.	POST-TEST	20	41.8	7.49		

Table.3: Analysis of intra group pre and post comparison of SNOT-22 (Group B) The result shows there is a significant difference in pre and post value of SNOT-22

Graph 3: Pre and Post comparison of SNOT-22 (Group B)



Graph 3 Shows that mean and standard deviation the SNOT-22 for Sinus Mobilization Technique

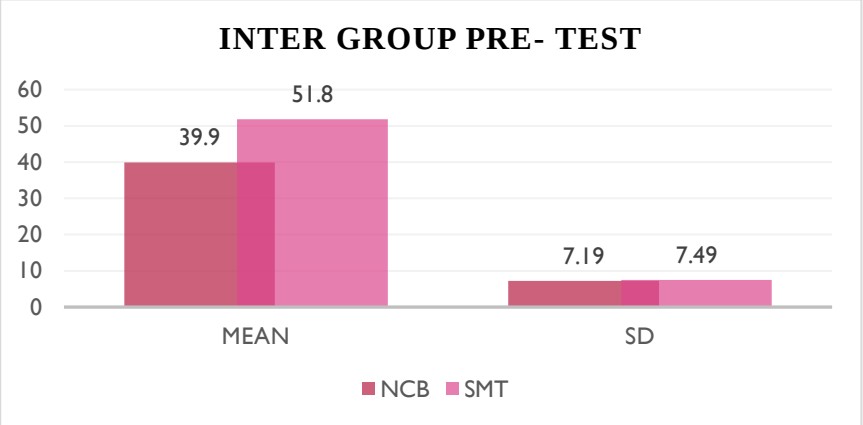
TABLE 4: INTER GROUP PRE- TEST COMPARISON OF SNOT-22

S.NO	GROUP	N	MEAN	SD	p value	t value
1.	NCB	20	39.9	7.19	<0.0001	5.126
2.	SMT	20	51.8	7.49		

Table.4: Analysis of inter group pre- test comparison of SNOT-22 Overall score

The result shows there is significant difference between in Pre values of SNOT-22– Overall score for NCB and SMT

Graph 4: Pre comparison of SNOT-22 (Group A & B)



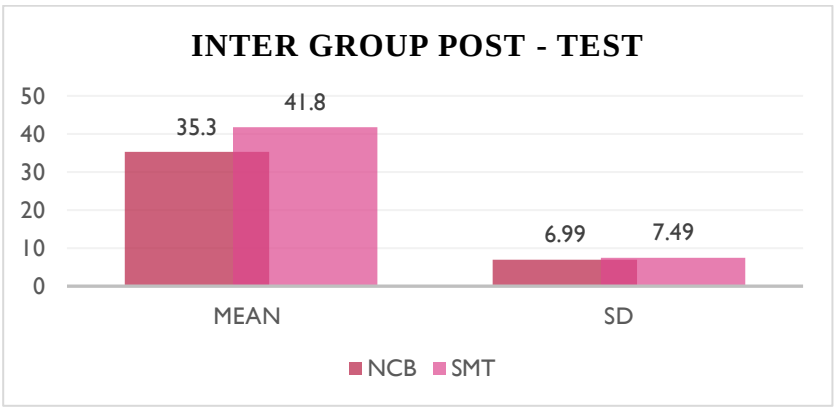
Graph 4 Shows that mean and standard deviation the SNOT-22 for both NCB & SMT

TABLE 5: INTER GROUP POST TEST COMPARISON OF SNOT-22

S.NO	GROUP	N	MEAN	SD	p value	t value
1.	NCB	20	35.3	6.99	0.0073	2.837
2.	SMT	20	41.8	7.49		

Table.5: Analysis of inter group post- test comparison of SNOT-22 – Overall score. The result shows there is significant difference between in post values of SNOT-22– Overall score for NCB and SMT

Graph 5: Post comparison of SNOT-22 (Group A & B)



Graph 5 Shows that mean and standard deviation the SNOT-22 for both NCB & SMT

5. DISCUSSION

The findings of this study could have significant implications for clinical practice, particularly in integrating non-invasive techniques like nasal cycle breathing and sinus mobilization into treatment regimens for chronic sinusitis. These interventions may offer patients an alternative to more traditional treatments, such as long-term decongestant use or antibiotics. Furthermore, the combination of both techniques may provide superior outcomes compared to each technique alone.

DiGiovanna et al. [28] found that chronic sinusitis is almost always associated with somatic dysfunction of the cervical spine. Sympathetic innervation to the sinuses arises from the upper thorax and travels through the cervical region. Hence treating cervical somatic dysfunction and performing sinus drainage techniques helps to relieve pain and as well as assist in the drainage of the sinuses. These techniques used are fully explained in most osteopathic handbooks. However, none of them fully explain the effectiveness of one technique over another.

This study is to investigate a shorter treatment with one technique as opposed to using several. This would deliver maximum pain relief from OMT and therefore improve the patients' comfort leading to improved treatment outcome in a shorter time scale allowing the practitioner to work on associated tissues causing symptoms. From a quantitative perspective, the study design will contribute towards creating additional research towards the field of osteopathy by assessing if a streamlined OMT is just as effective compared with a combined OMT technique therefore potentially to improve patients' comfort with less treatment time. This could support the relevance of osteopathy in establishing whether this manual technique 'frontal lift' can be a significant factor contributing towards an individual's health. [10][11] Integration of findings from the present study with previous concepts concerning the control of Reaction during exercise allows for further insights into the mechanisms by which Reaction may be minimized during exercise. The total Reaction for each nasal passage may be modelled as two variable resistors in series, whereas the combination of the two nasal passages behaves as two variable resistors in parallel. At rest, about two-thirds of the Reaction for each nasal passage occurs in the region of the ostium Internum and the remaining one-third in the cartilaginous nasal vestibule. In these responder sub-jects, during exclusive nasal breathing, ENDS de-creases Rn and stabilizes the lateral nasal vestibule walls, thus decreasing the inspiratory pressure losses associated with hysteresis of the inspiratory limb of the trans nasal pressure-flow relationship. These effects of ENDS result in a significant decrease in the WONB, particularly during inspiration, and a tendency for V˙ Ito increase at any given external work rate. We speculate that this is likely to translate into an energetic advantage of using ENDS during exercise that involves nasal route breathing. He nasal airway structure data of this model was obtained from a healthy male with no apparent anatomical variations in the nasal cavity. The model was used to investigate the air conditioning characteristics during the inhalation part of one breathing cycle. [23]

The nasal cycle is characterized by the alternating contraction and relaxation of the left and right nasal cavity mucosa. This causes alternating changes in nasal airway volume and resistance, which regulate the primary ventilation function of each side of the nasal cavity. Nasal resistance is lower on the side with a larger cross-sectional area. The alternating primary ventilation function of the bilateral nasal cavities relieves the alternating breathing load of both sides and can protect the nasal cavity, especially the upper and lower parts of the total nasal cavity.

6. CONCLUSION

This study aims to provide valuable insights into the effectiveness of nasal cycle breathing and sinus mobilization in the management of chronic sinusitis. If the results show positive improvements in symptom relief and sinus function, these techniques could serve as viable non-pharmacological adjuncts for managing sinusitis, particularly for patients seeking alternatives to medication.

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CONFLICT OF INTERESTS: The study has no conflict of interest.

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