



# EFFECTIVENESS OF PAPWORTH BREATHING AND ANULOM VILOM PRANAYAM ON QUALITY OF LIFE AND PEFR IN ADOLESCENT WITH BRONCHIAL ASTHMA.

## A COMPARITIVE STUDY

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### ABSTRACT

#### Background:

Bronchial asthma, characterized by chronic inflammation, bronchial hyperreactivity, and reversible airway obstruction, is often exacerbated by environmental allergens. The Papworth breathing method and Anulom Vilom Pranayam are two approaches used to manage these symptoms. The SF-36 questionnaire assesses various facets of health-related quality of life.

#### Aim & Objective:

This study sought to evaluate the efficacy of the Papworth breathing method and Anulom Vilom Pranayam in improving the quality of life and Peak Expiratory Flow Rate (PEFR) in adolescents diagnosed with bronchial asthma.

## Methodology:

Seventy participants were drawn from schools and clinics in the Pune region and allocated to either the Papworth group or the Anulom Vilom group. Both groups received training in their respective techniques and participated in three weekly sessions over a span of four weeks.

## Results:

The analysis revealed significant improvements in both groups. The p-value for PEFr was 0.0007, signifying a substantial enhancement in PEFr. Furthermore, the p-value for the SF-36 questionnaire was less than 0.0001, indicating a marked improvement in the quality of life of the participants.

## Conclusion:

While both the Papworth and Anulom Vilom methods demonstrated substantial efficacy, the data suggests that Anulom Vilom may offer superior outcomes for adolescents managing bronchial asthma. Nevertheless, individual preferences and patient-specific considerations should inform the choice of therapeutic approach. Further research and clinical evaluation are essential to corroborate these findings and provide a comprehensive assessment of the relative effectiveness of these breathing techniques.

Keywords – AV, Anulom Vilom, Papworth, PEFr, SF-36, Asthma

## INTRODUCTION

Bronchial asthma is a chronic inflammatory disease based on an inappropriate stimulation of the immune system, for instance by environmental aeroallergens. It is characterised by bronchial hyperreactivity, reversible airway obstruction and mucus overproduction 1.

Asthma is a globally significant noncommunicable disease with major public health consequences for both children and adults, including high morbidity and mortality in severe cases.

Asthma may impair airway development, reduce lung function growth and reduce maximally attained peak lung function potential, and these lung function deficits may persist into adulthood without additional progressive loss .2

The prevalence of Bronchial Asthma has increased continuously since the 1970s, and now affects an estimated 4 to 7% of the people worldwide. Childhood Bronchial Asthma varies widely from country to country. At the age of six to seven years, the prevalence ranges from 4 to 32%.

In Indian adolescent population Overall weighted mean prevalence was found to be 2.742.

Asthma significantly adversely affects the QoL of the affected children. 3

SF-36 Questionnaire is based on 36 items selected to represent nine health concepts (physical, social, and role functioning; mental health; health perceptions; energy or fatigue; pain; and general health).

The SF-36 questionnaire is valid and reliable in asthma and can be used to examine QOL in asthmatics.4

Peak expiratory flow rate (PEFR) is the maximal expiratory flow rate sustained by a subject for at least 10 milliseconds expressed in Litre per minute (L/min). PEFR is a simple, reliable, reproducible and easily measurable ventilatory lung function test. 5

A sequence of integrated breathing and relaxation exercises known as the Papworth method was developed in the 1960s. This method focuses on problems of dysfunctional breathing including hyperventilation and hyperinflation that are often found in asthma sufferers. The cycle of breathlessness and wheezing is frequently accompanied by anxiety and compounded by complex physiological mechanisms. It is believed that the Papworth breathing method leads to reduced asthma symptoms, anxiety and symptoms arising from Hypocapnia. 6

Anulom-vilom: It is an alternative nostril breathing exercise which includes inhalation, retention and exhalation. The breathing is done only through one nostril which is alternated. During the process, the other nostril is closed using the fingers. The thumb is used to close the right nostril and the right ring and little fingers are used to close the left nostril. 7

Bronchial Asthma is one of the leading cause of morbidity and mortality in children in India.

Breathing techniques has shown a significant effect on the symptoms of Bronchial Asthma such as Increased Lung capacity, Improved PEFR scores and Improved Quality of Life.

## REVIEW OF LITERATURE

1. Holloway EA, West RJ Integrated breathing and relaxation training (the Papworth method ) for adults with asthma in primary care: a randomised controlled trial *Thorax* 2007;62:1039-1042.

An integrated breathing and relaxation technique known as the Papworth method has been implemented by physiotherapists since the 1960s for patients with asthma and dysfunctional breathing, but no controlled trials have been reported. This study evaluated the effectiveness of the Papworth method in a randomised controlled trial.

Eighty-five patients (36 men) were individually randomised to the control group (n = 46) or to the intervention group receiving five sessions of treatment by the Papworth method (n = 39). Both groups received usual medical care. Assessments were undertaken at baseline, post-treatment (6 months after baseline) and at 12 months. The primary outcome measure was the St George's Respiratory Symptoms Questionnaire (SGRQ). Secondary outcome measures included the Hospital Anxiety and Depression Scale (HADS), the Nijmegen dysfunctional breathing questionnaire and objective measures of respiratory function. The Papworth method appears to ameliorate respiratory symptoms, dysfunctional breathing and adverse mood compared with usual care. Further controlled trials are warranted to confirm this finding, assess the effect in other patient groups and determine whether there is some effect on objective measures of respiratory function

2. Sharmila P, Sreelekha B. Effectiveness of Pranayama on Bio-physiological Parameters Among Patients with Bronchial Asthma. *Nursing Journal of India*. 2019 Jul 1;110(4):153-5.

This study assesses the effectiveness of pranayama on bio-physiological parameters among patients with bronchial asthma admitted in Sri Ramachandra Hospital, Porur, Chennai. O

The study had two objectives: (1) To assess the anxiety, oxygen saturation, respiration rate and

PEFR among patients with bronchial asthma. (2) To evaluate the effectiveness of pranayama on bio-physiological parameters among patients with bronchial asthma.

The study concluded that the pranayama is an effective method to reduce the anxiety, maintain the respiration rate and increase the oxygen saturation, and PEFR among patients with bronchial asthma.

3. Bal (2015) carried out a study to find out the impact of short-term training of Anulom vilom on respiratory parameters; 40 samples (experimental group-20 and control group-20) were recruited from the Department of Physical Education Guru Nanak Dev University Amritsar, between the ages 21-26 years. The subjects from experimental group were subjected to practice anulom vilom pranayama for four weeks and the control group was asked to perform the routine activities. PFT was measured in both the groups. The study results depicted significant differences in ERV (experimental group  $t=2.39$ ,  $p=0.02$ ) and control group ( $t=1.17$ ,  $p=0.02$ ), IRV (experimental group  $t=11.19$ ,  $p=0.0001$ ; control group  $t=0.55$ ,  $p=0.58$ ; VC experimental group was  $t=8.26$ ,  $p=0.0001$ ; and for control group  $t=1.15$ ,  $p=0.26$ . Thus, anulom vilom pranayama was found to be more effective in improving the lung function.

4. Rajappa & Shaji (2015) studied the effect of breathing techniques on pulmonary functions in patients with bronchial asthma before and after yogic pranayama intervention for two months in Nellore. Eighty stable asthmatic patients were selected and randomized into two groups: pranayama training group and the control group. The interventions Bhastrika, and anulom vilom pranayama were practiced by group I for two months. Lung functions were recorded for all the patients as a baseline, and then after two months, both the groups were allowed to continue their usual physical activity and medications. Group I showed a statistically significant improvement in FVC ( $p=0.11$ ), FEV1 ( $p=0.15$ ), PEFR ( $p=0.05$ ) and quality of life. The results showed that pranayama was useful to increase the strength of chest muscles,



## AIM

To find effectiveness of Papworth breathing method and Anulom Vilom Pranayam on quality of life and PEFR in adolescent with bronchial asthma.

## OBJECTIVES

To see the effect of Papworth breathing method in adolescent with bronchial asthma

To see the effect of Anulom Vilom Pranayam in adolescent with bronchial asthma.

To compare the effect of Papworth breathing method and Anulom vilom in adolescent with bronchial asthma.

## HYPOTHESIS

Null hypothesis – There will be no significant difference between Papworth breathing method and Anulom Vilom Pranayam on Quality of life and PEFR in adolescent with bronchial asthma.

Alternate Hypothesis –

Alternate hypothesis 1 - There will be significant effect of Papworth Breathing method than Anulom Vilom on Quality of life and PEFR in adolescent with bronchial asthma.

Alternate hypothesis 2 - There will be significant effect of Anulom Vilom than Papworth Breathing method on Quality of life and PEFR in adolescent with bronchial asthma.

Alternate hypothesis 3 - There will be significant effect of Anulom Vilom on Quality of life than PEFR in adolescent with bronchial asthma.

Alternate hypothesis 4 - There will be significant effect of Papworth Breathing on Quality of life than PEFR in adolescent with bronchial asthma.

Alternate hypothesis 5 - There will be significant effect of Anulom Vilom on PEFR than Quality of Life in adolescent with bronchial asthma.

Alternate hypothesis 6 - There will be significant effect of Papworth Breathing on PEFr than Quality of Life in adolescent with bronchial asthma.

## METHODOLOGY

STUDY DESIGN – Comparative

SAMPLE SIZE – 70

SAMPLING METHOD – Convenient Sampling

STUDY POPULATION – Adolescent with bronchial asthma aged 12-18 years

STUDY SETTING – School, College and Recreational centres in and around Pune.

STUDY DURATION – 4 Weeks

### INCLUSION CRITERIA

- 1) Adolescent (age 12-18)
- 2) Diagnosed Chronic Asthma
- 3) More than 50% of the predicted value of PEFr

### EXCLUSION CRITERIA

- 1) Acute asthma
- 2) Less than 50% of predicted value of PEFr
- 3) Neurological signs and symptoms
- 4) Down syndrome
- 5) SPO<sub>2</sub> less than 93%

## PROCEDURE

Ethical Clearance was taken from the ethical committee of PES Modern College of Physiotherapy.

The subjects were selected based on inclusion and exclusion criteria.

Pre treatment data for asthma, medical history, age, sex, PEFr and scores of Sf-36 questionnaire were taken.

The subjects were divided in 2 groups. Papworth group and Anulom Vilom group.

Both the groups were taught respective methods and sessions were monitored for 3 days / week for 4 weeks.

Post completion of 4 weeks post treatment data was recorded and scores of outcome measures were evaluated.

### ANULOM VILOM

The patient was instructed to sit upright and follow a specific breathing exercise.

They began by closing their right nostril with their right thumb and inhaling slowly through the left nostril for a duration of 2 seconds.

Then, they switched by closing the left nostril with their ring finger, releasing the right nostril, and exhaling for 4 seconds.

The process was repeated by inhaling through the right nostril and performing the same sequence.

This breathing practice was recommended to be done twice daily, with each session lasting 5 minutes.



## PAPWORTH BREATHING METHOD

The patient was made comfortable by sitting in an armchair.

One hand was rested on the upper chest, and the other on the upper abdominal wall.

The patient was instructed to allow the upper chest to relax downward and, with each subsequent breath, let the upper abdomen swell forward during inhalation and gently relax backward during exhalation.

Once the breathing rhythm was established, a pause was introduced at the end of the exhalation phase to slow down the breathing rate to 8 breaths per minute.

The relaxation technique was taught to the patient while lying down with full support.

The method of contrast was initially employed, prompting the patient to tense up muscle groups like the arms as much as possible and then release them into complete relaxation.

This exercise highlighted the distinction between tension and relaxation, offering insight into the level of tension experienced by the patient.

The patient should practise at least twice a day for 20-30 minutes and think about his breathing for a few minutes each hour in between.

This leads on to general relaxation, where the patient is asked to close his eyes and concentrate on relaxing each muscle group in turn, starting at the feet and working all the way up the body to the neck and face muscles until the whole body feels comfortably warm and relaxed.

The patient should be warned that he is not aiming to fall asleep but should listen to the suggestions and be aware of the feeling of peace and calm that total relaxation brings.

## OUTCOME MEASURES

Sf-36 questionnaire

Pefr

DATA INTERPRETATION

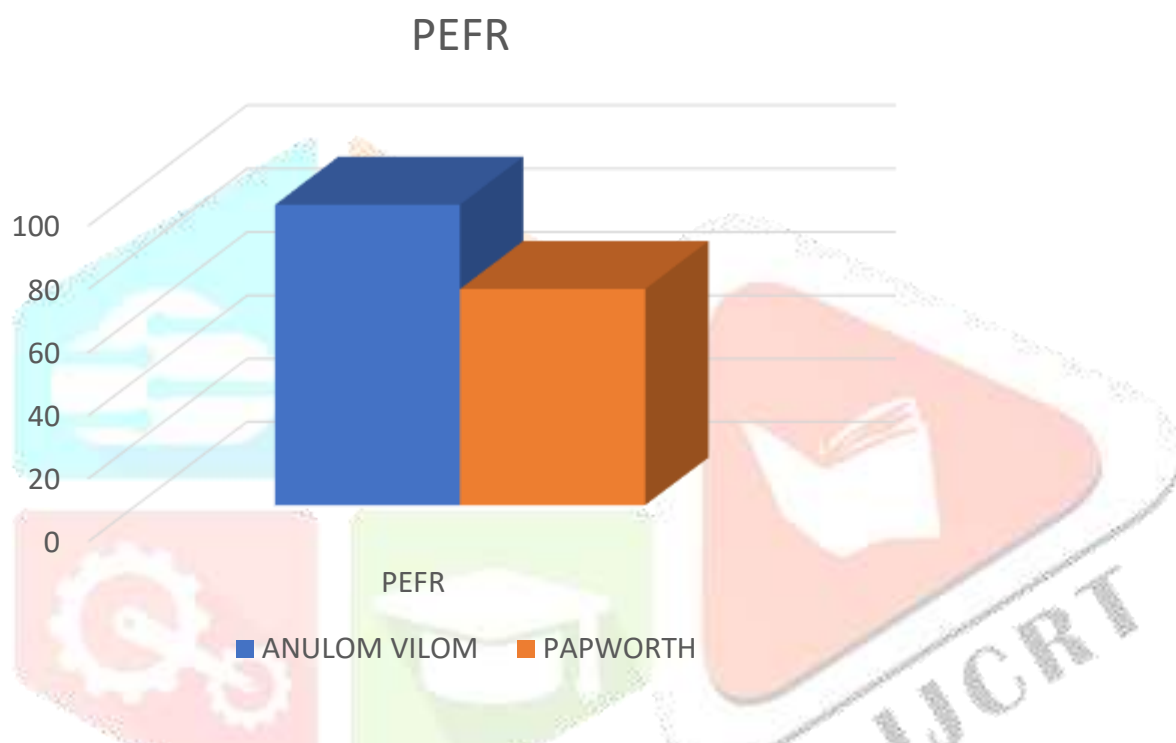
Unpaired t test as the subjects in both the groups are different

Results

P-Value equals to 0.0007 which is extremely statistically significant

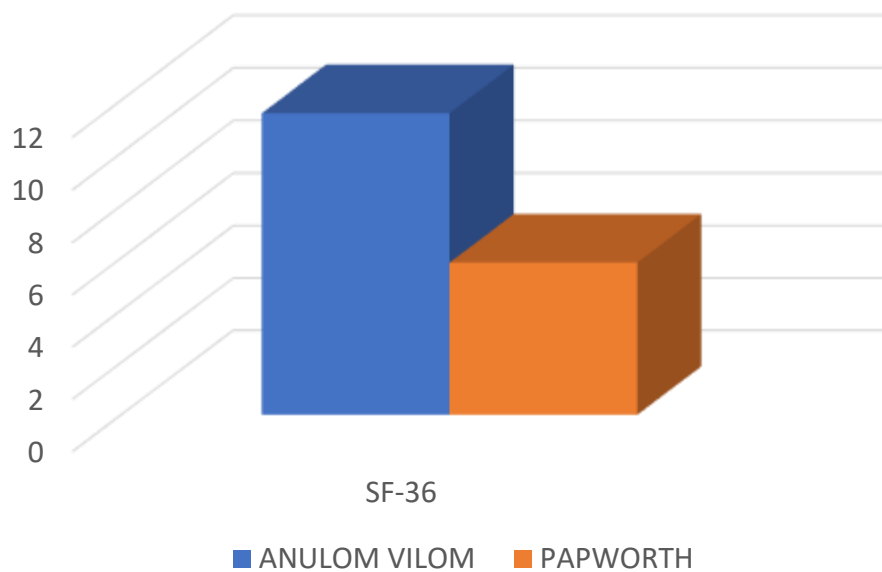
T value - 3.5385

RESULTS



GROUP	AV PEFR	PW PEFR
MEAN	95.14	68.57
SD	23.18	37.90

## SF-36



GROUP	AV SF36	PW SF36
MEAN	11.51	5.83
SD	4.27	2.75

P-Value is less than 0.0001 which is extremely statistically significant

T value - 6.6279C

The possible mechanism for PEFr and SF-36 improvement following anulom-vilom can be

1) Lung inflation near to total lung capacity is a major physiological stimulus for the release of lung surfactant and prostaglandins into alveolar spaces, which increase lung compliance and decreases bronchial smooth muscle tone respectively.

2) Increased power of respiratory muscles resulting from the hypertrophy (increased size) of these muscles is a common adaptation observed during controlled breathing exercises. By engaging in specific respiratory training, such as alternative nostril controlled breathing exercises, individuals can strengthen their respiratory muscles, leading to improved breathing efficiency and endurance.

3) Anulom-Vilom breathing exercises train practitioners to use the diaphragmatic and abdominal muscles more efficiently thereby emptying and filling the respiratory apparatus more efficiently and completely<sup>8</sup>.

4) Anulom Vilom pranayama increases the level of Nitric oxide in the nasal cavity, which is important to bring back abnormal features of asthma to a normal state.

Rhythmic diaphragmatic breathing allows more air and oxygen to enter the air sacs of the lungs, which then gets into the bloodstream. This can improve the oxygen supply to the cilia in the nasal cavity, paranasal sinuses, and the rest of the respiratory tract. Having enough oxygen is crucial for a healthy nasal cavity and connected paranasal sinuses. Anulom Vilom pranayama helps enhance the availability of oxygen, both on the surface and in the body, which in turn satisfies the oxygen needs of the cilia and helps them function properly

5) Bernoulli's Principle is a simple concept that explains when air moves swiftly over a surface, it doesn't push on the surface as hard. This can cause a pulling or negative pressure effect in the space where the air is moving.

In relation to breathing, when someone takes a breath in (inspiration), during a deep exhale that's part of Anulom Vilom Pranayama (AVP), their sinuses can expand more effectively than during a regular exhale. This happens because positive pressure forms in the nose during the second phase of AVP, which helps the sinuses inflate better<sup>8</sup>

6) With its calming effect on the mind it can reduce and release emotional stresses, thereby withdrawing the broncho-constrictor effect and thus can improve the quality of life through the following mechanisms 8

1. Activation of Parasympathetic Nervous System: Anulom Vilom involves slow, deep, and controlled breathing, which activates the parasympathetic nervous system. This branch of the autonomic nervous system is responsible for the body's "rest and digest" response, promoting relaxation and reducing stress.

2. Balanced Breathing: The alternate nostril breathing pattern in Anulom Vilom helps balance the flow of air and energy between the two sides of the brain. This balanced breathing can lead to a sense of calm and tranquility, reducing feelings of stress and anxiety.

3. Mindfulness and Focus: The rhythmic breathing pattern requires focus and mindfulness. By concentrating on the breath, individuals practicing Anulom Vilom can divert their attention away from stressors, leading to a more centered and present state of mind. 8

4. Reduced Cortisol Levels: Controlled breathing practices like Anulom Vilom have been associated with decreased cortisol levels. Cortisol is a hormone associated with stress, and lower levels can contribute to a more relaxed state.

5. Improved Oxygenation: Deep breathing in Anulom Vilom improves oxygen supply to the body, including the brain. Sufficient oxygenation is essential for cognitive function and can help alleviate stress and mental fatigue.

6. Slowing Heart Rate: The controlled breathing involved in Anulom Vilom can help slow down the heart rate, promoting a sense of calm and reducing the physiological signs of stress.

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