



EFFECT OF ADVANCED BUTEYKO BREATHING TECHNIQUE IN ASTHMATIC SUGARCANE WORKERS BY USING SIX MINUTE WALK TEST

An Experimental Study

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- Abstract:** Asthma, a heterogeneous and chronic respiratory condition characterized by variable expiratory airflow limitation and chronic airway inflammation, affects individuals globally, with a prevalence ranging from 1% to 18%. In India, approximately 2.05% to 3.5% of the population is affected. While asthma is seldom a direct cause of mortality, its impact rises exponentially after middle age, particularly in low- and middle-income groups. Complementary approaches, such as the Buteyko breathing technique, present an alternative for managing asthma symptoms. Originating in Russia in the 1950s, this method involves specific breathing exercises, breath-holding, and a recommended four-week treatment protocol. Studies suggest its efficacy in reducing asthma symptoms and improving walking capacity.
- Method -** Experimental study was conducted on 28 Subjects. According to the inclusion and exclusion criteria. Subjects were selected and explained about the procedure and informed consent was taken from all the included subjects and The Buteyko breathing technique was explained to the Participant and pre and post response was noted. Then data was collected and analyzed further .
- Result - :** In the study, total no of participants are 28, Result of study is made by using Buteyko breathing technique and six minute walk test, breathing exercise was explained to the patients and pre and post response was noted. Female participants 36 which is 36% and male participants 65 which is 64% Participants between the Age group 25-35 years are 38 participants and between the age group 36-45 years are 63 participants. After conducting this study, it was recorded that walking distance of individual in six-minute walk test improved from $392.14 \pm 71.80\text{m}$ to $469.28 \pm 72.76\text{m}$ after butekyo breathing technique ($p < 0.001$) Results of paired t-test indicated that there is significant difference between pre and post walking capacity of participants.

4. Conclusion – This study concluded that advanced buteyko breathing technique led to an improvement in six- minute walking distance of the participants.

I. INTRODUCTION

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms that vary over time and in intensity, together with variable expiratory airflow limitation (GINA 2015).⁽¹⁾

Asthma can affect people of any age, but often starts in childhood. Prevalence of asthma Globally- 1% to 18% (300 million) India -: 2.05% to 3.5% (17-30 million) Asthma is a rare cause of mortality, contributing to less than 1% of all deaths in most countries worldwide. The annual death rate of asthma in India is 250,000. Rates of death rise almost exponentially from mid-childhood to old age .The majority of asthma deaths occur after middle age in low- and middle-income groups.

Asthma is a chronic respiratory condition with a complex pathophysiology. It involves airway inflammation, which leads to the swelling of airway walls and an increase in mucus production. This inflammation is associated with the infiltration of immune cells like eosinophils and T-lymphocytes. Additionally, smooth muscles surrounding the airways can contract excessively, resulting in bronchoconstriction and reduced airflow. People with asthma often have hyperresponsive airways, making them more sensitive to triggers like allergens. In allergic asthma, the immune system produces excess IgE antibodies in response to allergens, leading to an allergic response and further bronchoconstriction Symptoms include wheeze, shortness of breath, chest tightness or cough and variable expiratory airflow limitation often worse at night or in the early morning vary over time and in intensity. The causes of asthma are not well understood.⁽³⁾

A number of risk factors are associated with the condition, often in combination which can be genetic and/or environmental.⁽²⁾

These variants are often triggered by factors such as exercise, allergens/irritant exposure, change in weather, or viral respiratory infections. Asthma is diagnosed by identifying the characteristic pattern of respiratory symptoms and variable expiratory airflow limitation.

Conservative treatment for bronchial asthma includes pharmacological and physical therapy. Pharmacological treatment includes Inhaled Corticosteroids (ICS) and Bronchodilators like Short-acting beta2-agonist (SABA) and Long-acting beta2-agonist (LABA). Physical therapy treatment for bronchial asthma is given to prevent chronic symptoms, to reduce frequent use of SABA, to maintain normal pulmonary function, to prevent exacerbations, minimize the need of emergency care, hospitalization, prevent loss of lung function and to prevent adverse effects of therapy by breathing exercises, chest percussion, postural drainage, active cycle of breathing technique and chest mobility exercises.

Sugar industry occupies an important place among organized industries in India sugar industry, one of the major agro based industrial in India, has been instrumental in resource mobilization, employment generation, income generation and creating social infrastructure in rural areas. Workers in developing countries like India face as many work related health problems like asthma. Sugarcane workers are exposed to diverse and potentially hazardous biological agent such as bagasse dust, allergens. The exposure tends to accumulate chronically in sugarcane factory workers every day at work, Such exposure accumulate in body and can cause asthma. Breathing techniques along with pharmacological treatment showed better results in reducing asthma symptoms and improving the pulmonary function. Several studies found out of that breathing techniques like Buteyko breathing technique were found to be effective to treat asthma.

II. METHODOLOGY

Experimental study was conducted on 28 Subjects. According to the inclusion and exclusion criteria. Ethical approval was taken. Subjects were selected and explained about the procedure and informed consent was taken from all the included subjects and The Buteyko breathing exercise was explained to the Participant and response was noted. Then data was collected and analyzed further .

III. A INCLUSION CRITERIA

- Workers who are willing to participate.⁽¹⁾
- Workers with age of 25-54 years who is suffering from asthma.⁽¹⁾
- Workers who are working for 7-8 hours.⁽²⁾
- Both genders [male and female]⁽¹⁾
- Workers who have asthma since 3 years.⁽²⁾

B EXCLUSION CRITERIA

- Those who have undergone any recent surgery.(Lower limb fracture)⁽¹⁾
- Those who have heart disease.(Arrhythmias, angina pectoris, atherosclerosis)⁽¹⁾

- Pregnancy(
- Workers who have mental retardation. ⁽¹⁾
- Chest pain ⁽¹⁾

IV. OUTCOME MEASURE

1)SIX MINUTE WALK TEST

2)MODIFIED BORG SCALE (Reability- 0.898)

Ethical approval was taken from ethical committee.

Individuals fulfilling the inclusive criteria were approached and informed consent of participants was taken.

2 of the participants were dropped out due to unavailability during treatment.

In a pre-assessment protocol, the Modified Borg Scale is utilized to evaluate dyspnea levels. This assessment is complemented by the monitoring of vital parameters, including blood pressure (BP), oxygen saturation (SpO₂), pulse rate (PR), and respiratory rate (RR), to provide a comprehensive assessment of an individual's health. Furthermore, a 6-minute walk test is conducted to assess walking distance. Subsequently, evaluation is carried out, which involves re-assessing these parameters and dyspnea level.

Participant were received 4 weeks of treatment. introduction to the technique and its basics was explained to the participants. The do's and don'ts were explained, If at any time participants experienced anxiety, shortness of breath, or intense discomfort, discontinue the practice and breath normally. The participants were encouraged to practice regularly, ideally 20mins a day.

The advanced Buteyko breathing technique is thought as follows:

Sit on the floor or on a chair or standing.

Elongate your spine to maintain an upright posture.

Relax your respiration muscles.

Ask the participant to take breathe in and out normally (2-3 times)

Take a small breath in (2 s) and a small breath out (3 s).

Pinch your nose on the "out" breath,

Hold your breath as the therapist counts one, two, three

Release the breath

Repeat the procedure while the therapist increases hold count up to 5 and then gradually decreases it with each repeat (total 5)

Tips for beginners : When practicing advanced Buteyko breathing, always breathe in and out through your nose. After giving 4 weeks of treatment, the post-assessment protocol checked vital signs like BP (blood pressure), SPO₂ (oxygen saturation), PR (pulse rate), and RR (respiratory rate). A 6-minute walk test was conducted, and dyspnea levels were assessed before and after the test. After the 6-minute walk test, the walking distance covered was measured. These assessments allowed for an evaluation of whether there had been an improvement in the patient's condition after the 4-week treatment period.



Fig shows six minute walk test

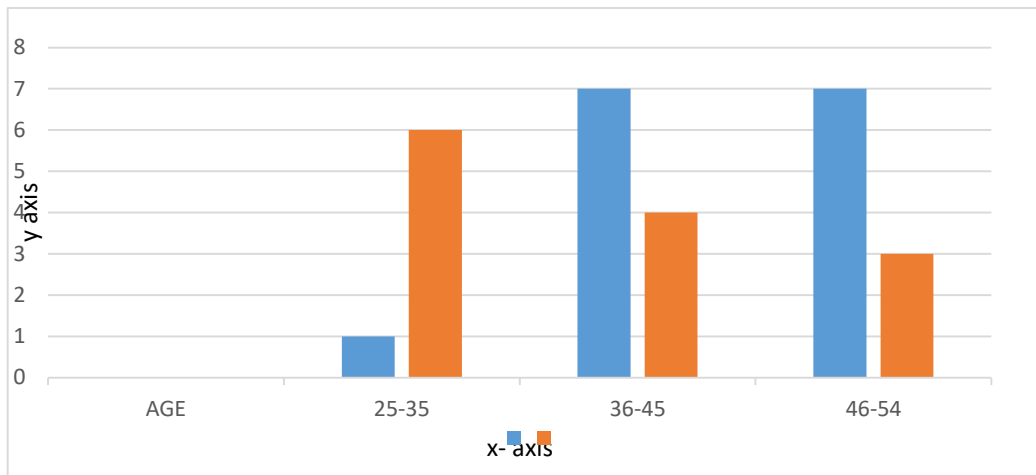
V. STATISTICAL ANALYSIS

Data was collected and analysed.

VI. RESULTS

GRAPH 1: AGE WISE DISTRIBUTION:

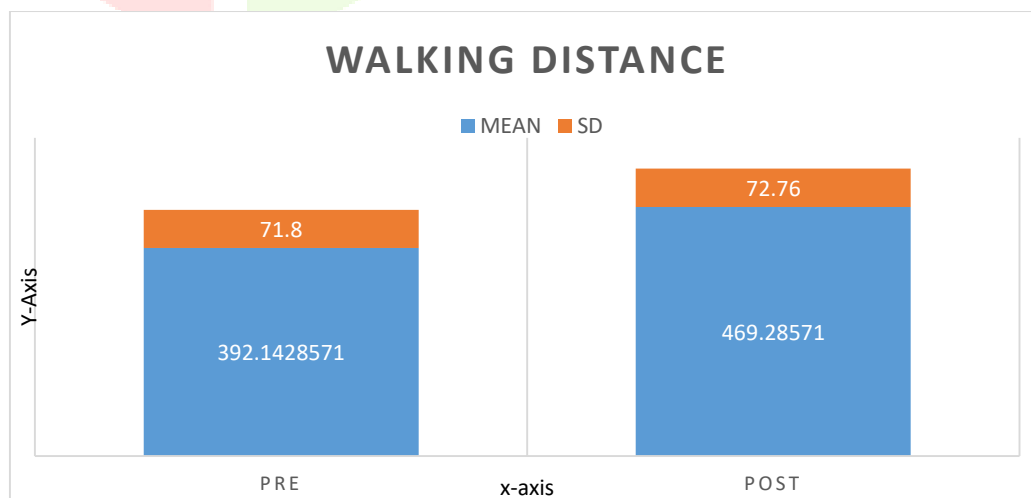
AGE	MALE	FEMALE
25-35	1	6
36-45	7	4
46-54	7	3



Interpretation- Table no 1 shows that out of 28 participants who participated in the study 1male and 6 female between age group 25-35; 7 male and 4 female between age group 36-45; 7male and 3 female between age group 46-54

Graph 2: Comparison Of 6MWD Before and After Treatment

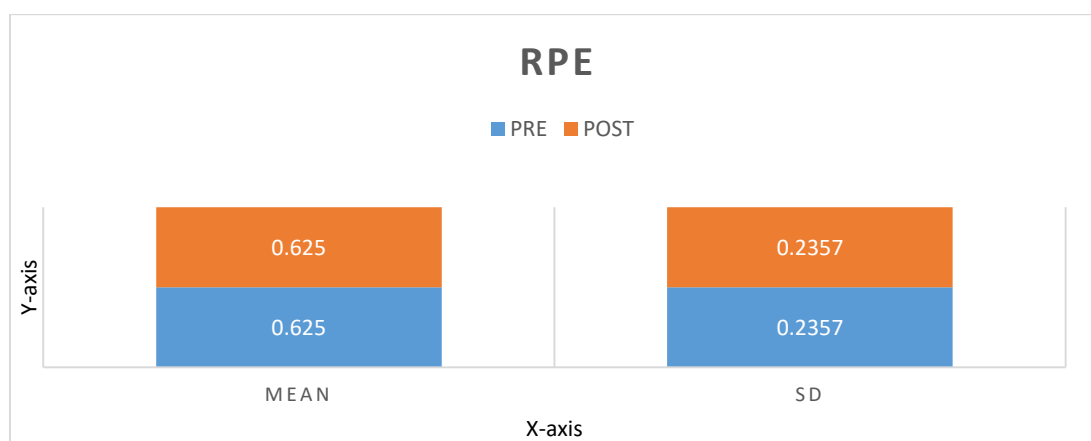
Parameter	Value
p-value	0.0000002029
t	6.9046
Sample size (n)	28
Average of differences (\bar{x}_d)	77.1429
SD of differences (S_d)	59.1205



Interpretation: Paired t- test indicated that, there is significant difference in walking distance (M:392.14; SD-71.80) and after (M- 469.28; SD-72.76)

Graph 3 : Comparison Of RPE Before And After Treatment

Parameter	values
p-value	1
t	0
Sample size (n)	28
Average of differences (\bar{x}_d)	0
SD of differences (S_d)	0.2357



INTERPRETATION: The paired-t test indicated that there is no significant difference in RPE Before & After 4 weeks of treatment. Before rpe (M=0.6;SD=0.2) and After rpe (M=0.6;SD=0.2); p=1.

VII. DISCUSSION

The project was conducted for 4 weeks with workers from sugar factory with 3 or more than 3 years of experience and age group of 25-54years was selected in the study. This research was undertaken with the aim to check the effect of advanced buteyko breathing technique in Asthmatic Sugarcane factory workers by using six-minute walk test.

2 of the participants were dropped out due to unavailability during treatment.

The study encompassed a pre-assessment and post-assessment protocol. During the pre-assessment, rpe level were evaluated using the modified borg scale, vital parameter are monitored such as blood pressure, oxygen saturation, pulse rate, and respiratory rate. Six-minute walk test was conducted to measure the walking distance. Participant were introduced to the advanced buteyko breathing technique, emphasizing nasal breathing. Introduction to the technique and its basics was explained to the participants, including the do's and don'ts of the technique. Participants were encouraged to practice the technique for 20mins a day and advised to discontinued if experiencing discomfort. The post-assessment involved repeating the same assessment after 4 weeks of breathing technique to determine any changes in the participant's physical endurance.

The advanced Buteyko breathing technique, known for its emphasis on nasal breathing, can induce notable biomechanical changes in individuals. Regular practice improves diaphragmatic function, enhancing the efficiency of this muscle during breathing. Nasal passages may undergo adaptations, potentially improving airflow and filtering the inhaled air. The technique encourages a reduced breathing rate, leading to better respiratory muscle coordination and overall lung function. Additionally, by maintaining a balanced ratio of oxygen to carbon dioxide in the bloodstream, the technique may enhance oxygen delivery to tissues, potentially boosting energy levels and endurance. These combined changes optimize the respiratory process, potentially benefiting participants, particularly those with asthma, by promoting efficient breathing and enhancing overall physical well-being. Buteyko breathing is a technique that has gained attention for its potential in managing asthma effectively. ^(8,9)

Several studies have its positive outcomes in alleviating asthma symptoms and improving the overall well-being of individuals dealing with this respiratory condition.

One such study conducted by Mohamed et al in 2019, published in the International Journal of Midwifery and Nursing Practice, showcased encouraging results. Their research concluded that engaging in Buteyko Breathing exercises led to a notable reduction in asthma symptoms and severity. This suggests that the practice of Buteyko breathing can be beneficial for individuals grappling with the challenges of asthma, potentially providing a practical approach to symptom management and improved quality of life. ⁽¹¹⁾

In a similar vein, a study by Prasanna K. B. et al in 2015, published in the International Journal of Medicine and Public Health, offered further support for the effectiveness of Buteyko breathing. Their findings emphasized that this breathing technique exhibited efficacy, surpassing standard treatment, especially in individuals newly diagnosed with asthma. This endorsement underlines the potential of Buteyko breathing as a viable complementary approach to conventional asthma management, especially in the early stages of the condition. ⁽¹³⁾

Furthermore, a study by S. Copper et al in 2003, published in Thorax, added to the body of evidence supporting Buteyko breathing. This particular research demonstrated that the Buteyko breathing technique not only improved asthma symptoms but also reduced the need for bronchodilator usage, a significant aspect of asthma management. Additionally, the study documented enhanced walking distance in participants through the six-minute walk test after incorporating the Buteyko breathing technique. This facet reveals a potential improvement in physical endurance and overall well-being. ⁽⁶⁾

our study also recorded that walking distance of individual in six-minute walk test improved from 392.14 ± 71.80 to 469.28 ± 72.76 after butekyo breathing technique ($p < 0.001$). Results of paired t-test indicated that there is significant difference between pre and post, walking distance of participants.

The improvement in walking distance is clinically significant because it represents a substantial increase in the participant's physical endurance. In other terms, this means that participants with asthma, such as sugarcane workers, can walk a significantly greater distance in six minutes after undergoing advanced butekyo breathing technique. this improvement suggests enhancement in their ability to engage in physical activities, which is essential for their daily lives and work performance.

VIII. CONCLUSION

This study concluded that advanced butekyo breathing technique led to an improvement in six-minute walking distance of the participants.

IX. LIMITATION OF STUDY

Study was conducted on a very small population in a specific region. However, there is a need of extensive study on this subject.

The six-minute walk test is a valid measure of physical endurance, using additional objective measures or functional assessments could provide a more comprehensive evaluation.

X. RECOMENDATION AND FUTURE SCOPE OF STUDY

Buteyko breathing exercise can be recommended as a primary intervention for the treatment of asthma as it is cost effective and equally effective as conventional treatment.

It can be practiced at primary healthcare centres.

It is also recommended to wear protective gears as mask to prevent asthma as "Prevention is better than cure".

Presented study can be replicated in other factories.

If extensive studies report the efficacy of advance butekyo breathing Techniques equivalent to conventional treatment of asthma, then it can be used as primary treatment.

It is cost free treatment so can be used by non-affording patients who previously wouldn't get themselves treated due to cost.

XI. REFERENCES

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