International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effectiveness of Crocodile Breathing Technique on Reducing Dyspnea, Rate of Perceived Exertion in Patient with Chronic Obstructive Pulmonary Disease: A Case Report

Dr Amar S. Damle[1], Dr. Krishna Kumar Singh[2], Dr. Nidhi S. Sharma[3]

[1]Assistant Professor, Department of Cardiovascular and Respiratory Physiotherapy, Ojas College of Physiotherapy, Jalna,
[2]Principal, Ojas College of Physiotherapy, Jalna
[3]Ojas College Of Physiotherapy, Jalna, India.

ABSTRACT

Global Initiative for Chronic Obstructive Lung Disease 2023 defines COPD as a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, expectoration, and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction. We present the case of a 54-year-old male patient who presented with complaints of breathlessness and cough dry in nature diagnosed with Chronic Obstructive Pulmonary disease. The patient was subsequently referred for chest physiotherapy department to address these Breathlessness. As physiotherapists, we employed breathing exercises, and Crocodile Breathing Technique. This case ensures the significance of chest Crocodile Breathing Technique for patients with COPD. Outcome measures included the Modified Medical Research Council dyspnea grading scale, Borg-20 scale for rate of perceived exertion, the Functional Independence Measure score. Following the Physiotherapy management program, improvements were observed in all outcome measures. These findings indicate that Breathing exercise along with Crocodile Breathing Technique can give benefit to the patients suffering from Chronic obstructive pulmonary disease by reducing Breathlessness and enhancing functional independence.

Keywords: COPD, Crocodile Breathing Technique, Dyspnea

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) presents a significant burden across numerous regions worldwide. There are over 230 million COPD cases among urban dwellers, reflecting a prevalence of 13.6%, while rural areas report 153.7 million cases, with a prevalence of 9.7%. The overall prevalence among men aged 30 years or older stands at 14.3% (95% CI 13.3%–15.3%), in stark contrast to the 7.6% (95% CI 7.0%–8.2%) observed in women.[1]

In India, the prevalence of chronic bronchitis in the general population ranges from 3.3% to 20.9%, with all figures except the highest falling at or below 9.1%. The GOLD 2023 guidelines define COPD as a heterogeneous lung condition marked by chronic respiratory symptoms—such as dyspnea, cough,

expectoration, and exacerbations—resulting from abnormalities in the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema). This condition leads to persistent, often progressive, airflow obstruction.[3]

Patients suffering from COPD typically experience symptoms including dyspnea, wheezing, chest tightness, fatigue, and limitations in physical activity, along with cough that may or may not involve sputum production. They are also prone to acute respiratory events, characterized by significant worsening of symptoms known as exacerbations, which necessitate specific preventive and therapeutic interventions.

Moreover, individuals with COPD often face multimorbidity, where the presence of other diseases severely impacts their overall health status and prognosis, independent of the severity of airflow obstruction due to COPD. Exacerbations can lead to a deterioration of symptoms and a decline in lung function, and in a small percentage of patients, recovery may not be achievable.

Exacerbations of chronic obstructive pulmonary disease (COPD) represent critical moments where patients experience a significant decline in their symptoms and lung function, potentially leading to lasting effects in some individuals. Common signs of an exacerbation include an intensified cough and heightened shortness of breath, which can severely impact daily activities. Patients requiring hospital care often face debilitating impairments in their overall functional status.

Multiple systemic factors strongly influence skeletal muscle performance in COPD sufferers, including inflammation, malnutrition, medication side effects, physical inactivity, age, low oxygen saturation, and a history of smoking. These elements advance physiological changes that alter the way ventilatory muscles are activated. For instance, the musculature of the rib cage increasingly supports chest wall movement, while the accessory muscles of ventilation become overly engaged. When inspiratory muscles fatigue, it can lead to asynchronous movements between the rib cage and abdominal muscles, causing abnormal abdominal contraction during inhalation.

To alleviate these challenges, incorporating targeted breathing exercises into patient care can be highly effective. Techniques such as diaphragmatic breathing (DB), pursed lip breathing (PLB), active expiration, and pranayama yoga focus on enhancing breath control and rhythm. By utilizing individualized goals and computerized feedback, these approaches empower patients and have been proven to lead to substantial acute improvements in gas exchange and overall ventilation. Embracing these techniques can significantly improve the quality of life for individuals living with COPD.

The impact of breathing exercises in patients with COPD may vary according to underlying physiology, the technique employed and the conditions of training. Some authors have reported that breathing exercises reduce dyspnoea in patients who are severely obstructed and hyperinflated (Bianchi 2007).

Crocodile breathing involves recruitment of the diaphragm in the prone position, increasing pelvic control, encouraging proper sequencing, and activation of core muscles which causes stabilization of the shoulder girdle, allowing the lower rib cage to expand.

It causes diaphragmatic recruitment, which triggers the body’s relaxation response, improves oxygen saturation and resolution of atelectasis, and lowers anxiety and eupnea.

Yong Ho Cho et al. (2019) observed that crocodile breathing was beneficial in managing musculoskeletal conditions such as lower back pain However, there is a lack of literature on the benefits of crocodile breathing in COPD.[8]

CASE PRESENTATION

Patient information

A 54-year-old male presented with complaints of breathlessness, cough which is dry in nature lasting for more than 3 months, coming a visit to the Physiotherapy Department. Investigations, including PFT and Xray, were conducted. The PFT Report Showed pure Obstructive Condition while Xray showed Hyperinflated lungs, flattened Diaphragm, increase in broncho-vascular Markings suggestive of Chronic Obstructive Pulmonary Disease. The patient received medical management and taking Meter dose inhaler of salbutamol 4 puff a day. His other medical and surgical history was not significant. He was advised to take physiotherapy treatment for further care under Cardiovascular and Respiratory Physiotherapy Department.

Clinical findings

Verbal consent was obtained from the patient before the assessment.

The patient lay supine during the examination and was hemodynamically stable, conscious, and well-oriented to time, place, and people.

According to the cardiorespiratory examination, the patient's vital signs included a pulse rate of 88 beats per minute, a respiratory rate of 30 breaths per minute, and a blood pressure of 136/86 mmHg. Arterial blood gas findings revealed a pH of 7.43, PCO2 of 31.6 mmHg, PO2 of 66.2 mmHg, and HCO3 of 24 Meq/L.

An X-ray was performed, which showed hyperinflated lungs, flattened Diaphragm, increase in Broncho-vascular Markings suggestive of Chronic obstructive pulmonary disease, chest movements were reduced. Auscultation revealed reduced air entry in bilateral lungs.

Investigation

Figure 1 Showed Xray Findings of Patient

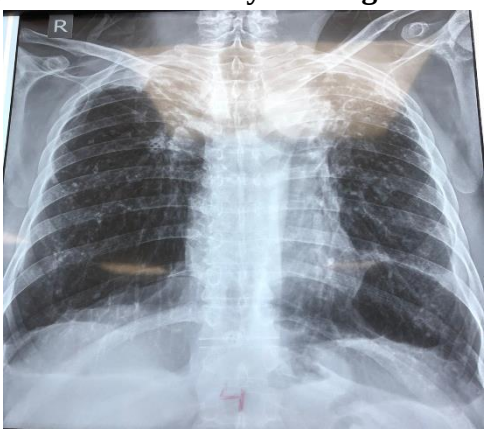

FIGURE 1: Chest X-ray showing hyperinflated lungs, flattened Diaphragm, increase in Broncho-vascular Markings

Timeline of events

The timeline of events according to the patient's condition is presented in Table 1.

Events	Timeline
Date of admission	12/11/2024
Date of assessment	13/11/2024
Date of physiotherapy intervention	13/11/2024
Date of discharge	23/11/2024

TABLE 1: Timeline of events according to the patient's condition

PHYSIOTHERAPY INTERVENTION

A multidimensional approach is required to help patients with asthma to guarantee a better quality of life and disease management to manage symptoms effectively.

About taking regular medications corticosteroids, many patients have shown concern and shown concernment towards without medication self-reliance approaches and about 30% of them reported that they practice breathing exercises to get relief from sign and symptoms.

Crocodile breathing involves recruitment of the diaphragm in the prone position, increasing pelvic control, encouraging proper sequencing, and activation of core muscles which causes stabilization of the shoulder girdle, allowing the lower rib cage to expand. It causes diaphragmatic recruitment, which triggers the body's relaxation response, improves oxygen saturation and resolution of atelectasis, and lowers anxiety and eupnea.

Crocodile breathing patient lies comfortably on abdomen with head in midline resting on both hands. Patients take slow nasal inhalation for 3 s, followed by a brief pause. Slow nasal exhalation for 4–6 s, followed by a longer pause. During the next breath cycle, the chest should expand, filling the "cylinder" of the abdomen. The anterior chest wall and abdomen are stabilized, and upper limbs are stabilized in abduction. During this therapist uses his hand to guide the patient in the lumber movement. Thus, greater pressure is placed on the posterior and lateral chest wall and pelvis during inspiration, reducing accessory muscle use.

Sr no.	Problem list	Goals	Physiotherapy intervention	Rationale	Dosage
1	Lack of Awareness about disease	Patient education	To explain the pathophysiology of COPD in patient's language	It facilitates the patient's increased understanding of the condition.	NA
2	Dyspnea	To reduce dyspnea	Crocodile Breathing Technique	Help in reducing the work of breathing	10 reps × 2 set
3	Reduced lung functioning	To improve lung functioning	Thoracic expansion exercise	Improves oxygenation and	10 reps × 2 set

4	Decreased strength	To improve strength	Strengthening of B/L upper and lower limb with 0.5kg weight cuff.	Help in improving peripheral muscle strength, hence improving functional capacity and cardiovascular endurance	10 reps × 1 set

TABLE 2: Treatment Protocol for patient

OUTCOME MEASURES

The Modified Medical Research Council (MMRC) Dyspnea, Scale Borg-20 Scale, Functional Independence Scale were used.

Outcome measures	Pre-intervention	Post-intervention
MMRC Dyspnea Scale	Grade 3	Grade 1
Borg's-20 scale	14	06
Functional Independence Measure	76/126	98/126

TABLE 3: Outcome measure for patient

DISCUSSION

This case study illustrates the effectiveness of a physical therapy intervention combined with the crocodile breathing technique in reducing dyspnea and the perceived exertion rate in patients with chronic obstructive lung disease (COPD). The observed decrease in Modified Medical Research Council (MMRC) grades highlights the positive impact of the crocodile breathing technique, complemented by additional breathing exercises.

Furthermore, there was a substantial improvement in Functional Independence Measure (FIM) scores across essential areas, including motor skills, cognitive function, and overall independence. The reductions noted on the Borg 20 scale also suggest significant improvements in the rate of perceived exertion, indicating enhanced performance in patients' activities of daily living (ADLs).

These advancements are critical since they are closely linked to improved functional performance in daily activities and a better overall quality of life (QOL). To enhance lung capacity further, diaphragmatic breathing and thoracic expansion exercises were implemented, proving beneficial for patients managing COPD. This holistic approach fosters not just physical health but also empowers patients to engage more fully in their daily lives.[9]

Individuals with chronic obstructive pulmonary disease (COPD) often exhibit altered breathing patterns and experience significant shortness of breath, particularly during physical exertion. This review aimed to assess the effectiveness of breathing exercises designed to retrain these patterns, focusing on reducing breathlessness, enhancing exercise capacity, and improving overall wellbeing for people living with COPD.[10]

One such technique, crocodile breathing, promotes the use of the diaphragm while in a prone position. This method facilitates better pelvic control, encourages proper sequencing of breath, and activates core muscles, leading to stabilization of the shoulder girdle and enabling the lower rib cage to expand effectively.

In a study by Chhaya Verma et al., it was demonstrated that crocodile breathing had a superior effect compared to simple prone positioning in COVID-19 patients. The findings indicated significant improvements in shortness of breath scale (SBC) ($P < 0.0001$), rate of perceived exertion ($P = 0.000$), and chest expansion ($P < 0.0001$). Participants reported that crocodile breathing was not only more effective but also a more comfortable and effective position to alleviate feelings of dyspnea. This highlights the potential benefits of incorporating such targeted breathing exercises into the management of COPD.[11]

Crocodile breathing promotes diaphragmatic recruitment, activating the body's relaxation response, improving oxygen saturation, resolving atelectasis, and reducing anxiety while facilitating normal breathing (eupnea). Despite these advantages, there is a notable lack of literature detailing the benefits of crocodile breathing specifically for respiratory diseases like chronic obstructive pulmonary disease (COPD). Therefore, this study aims to fill that gap and pave the way for future experimental research to explore the effectiveness of the crocodile breathing technique in various respiratory conditions. By expanding our understanding in this area, we can enhance therapeutic approaches and improve patient outcomes for those suffering from respiratory ailments.

CONCLUSION

The case demonstrates that Crocodile breathing along with breathing exercises is effective for reducing dyspnea and improving functional independence in patient with COPD.

Crocodile breathing is a good method for managing pain, muscle tone, and muscle stiffness in non-specific low back pain patients and it can also be used in reduction of breathlessness, improve rate of percieved exertion and functional independence of patient with COPD.

The Patient experienced significant improvements in dyspnea and functional independence.

Henceforth this study will be helpful in conducting further experimental studies to find out effectiveness of Crocodile breathing technique in other respiratory conditions.

DISCLOSURES

Human subjects: Consent was obtained by participant in this study.

Financial support: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work

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