An Observational Study of Active Cycle of Breathing Technique in Pneumonitic Patients

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Abstract-

Background*- A lung inflammation known as pneumonia primarily affects the tiny air sacs known as alveoli. Common symptoms include a combination of dry or productive cough, chest pain, fever, and breathing difficulties.*

Material and Method*: Six individuals of both sexes with mild to moderate pneumonia and a mean age of 40.020 13.600 were included in this study. Every patient underwent many sessions, or three times each week for a month-long active breathing cycle. The six-minute walk test and standardized airway questionnaire were used to collect data on functional ability and health-related quality of life before and after therapy. All six patients remained stable during the research.*

Results*: Following treatment sessions, the patient's functional capacity and health-related quality of life significantly improved, with means [104.382.4 for the first week, 137.6111.8 for the second week, 205.318130.5 for the third week, and 234.3123.3 for the fourth week], and the mean difference and six-minute wall test 3.121.2SD for the standardized airway questionnaire with a p-value [0.00] significant upon paired t-test.*

Conclusion*: Conclusion: Patients with mild to moderate pneumonia benefit greatly from the active cycle of breathing approach in terms of quality of life and functional capacity.*

I. INTRODUCTION

A lung inflammation known as pneumonia primarily affects the tiny air sacs known as alveoli[1]. There are a lot of different circumstances. The most prevalent causes of pneumonia are infections brought on by bacteria, viruses, and occasionally other microorganisms[2]. It is quite challenging to pinpoint the pathogen that is to blame. Chest X-rays, blood tests, and sputum culture may help confirm the diagnosis[2], but symptoms and physical examination are frequently the main determinants of the diagnosis[2]. According on how it was obtained, the illness might be categorized, such as community, hospital, or healthcare-associated pneumonia[3]. There are vaccines available to prevent specific types of pneumonia, including those brought on by the Streptococcus pneumoniae bacteria, linked to influenza, or associated to COVID-19[4]. Hand washing is one of the other preventative strategies.

Cystic fibrosis, chronic obstructive pulmonary disease (COPD), sickle cell disease, asthma, diabetes, heart failure, a history of smoking, a bad cough reflex (such as after a stroke), and a weakened immune system are among the risk factors for pneumonia[5,6,7].

Pneumonia has more than 30 different causes, which are categorized by the cause. The most common kinds of pneumonia include: Pneumonia has more than 30 different causes, which are categorized by the cause. The most common kinds of pneumonia include:

Bacterial pneumonia: - Many bacteria cause this kind. Streptococcus pneumoniae is the most prevalent. It typically happens when the body is compromised in some way, such as through disease, inadequate nutrition, ageing, or decreased immunity and the germs are able to enter the lungs. All ages can be affected by bacterial pneumonia, but if you misuse alcohol, smoke cigarettes, are physically weak, have just had surgery, have a respiratory condition or viral infection, or have a compromised immune system, your risk increases.

Viral pneumonia: - This type accounts for around one-third of all occurrences of pneumonia and is brought on by a variety of viruses, including the flu (influenza). If you have viral pneumonia, you can be more susceptible to developing bacterial pneumonia.

Mycoplasma pneumonia: - Atypical pneumonia is the name given to this variety, which has slightly different symptoms and physical indicators. Mycoplasma pneumoniae is the bacterium that causes it. It typically results in a broad, moderate pneumonia that affects people of all ages.

Other pneumonias: - Other, less frequent pneumonias may be brought on by different pathogens, like fungus.

The underlying reason determines the course of treatment. Antibiotics are used to treat pneumonia that is

thought to be caused by bacteria. The patient is typically hospitalized if the pneumonia is severe. If oxygen levels are low, oxygen treatment may be utilized[8].

Over 4 million people worldwide per year pass away from pneumonia, which affects roughly 450 million people worldwide[9] (7% of the population). The 20th century saw the development of antibiotics and vaccinations, which dramatically increased survival. Nonetheless, pneumonia continues to be the biggest cause of death in underdeveloped nations, as well as among the very young, the very old, and the chronically ill. The term "old man's friend" refers to pneumonia since it frequently reduces the amount of agony experienced by people who are already near to passing away.
A productive cough, fever with shaking chills, shortness of breath, a sharp or stabbing chest discomfort during deep breathes, and an accelerated pace of breathing are all common symptoms of infectious pneumonia. Confusion may be the most obvious symptom in older adults.

Fever, cough, and rapid or laboured breathing are the common signs and symptoms in children under five. Fever is not a highly specific symptom because it might be missing in old people, people with severe sickness, malnutrition, and many other common ailments. Moreover, toddlers under 2 months old typically lack a cough. Children may exhibit more severe signs and symptoms such as blue-tinged skin, a lack of thirst, convulsions, persistent vomiting, temperature extremes, or a diminished degree of consciousness.

Similar symptoms are frequently seen in pneumonia caused by viruses and bacteria. There are some causes that are linked to recognizable but general clinical traits. Abdominal pain, diarrhea, and confusion can accompany Legionella-related pneumonia. Rust-colored sputum is a symptom of Streptococcus pneumoniae pneumonia. Bloody sputum, frequently referred to as "currant jelly," can accompany pneumonia brought on by Klebsiella. Hemoptysis, or bloody sputum, can also be a symptom of lung abscesses, gram-negative pneumonia, tuberculosis, and acute bronchitis, which is more common. Mycoplasma pneumoniae-related pneumonia may coexist with joint pain, swollen lymph nodes in the neck, or an ear infection in the middle ear. Compared to bacterial pneumonia, viral pneumonia more frequently manifests as wheezing. Based on the notion that the way pneumonia presented foretold its underlying etiology, it was historically separated into "typical" and "atypical" forms. It is no longer stressed because the evidence does not support this distinction.

Infections primarily brought on by bacteria or viruses, and less frequently by fungi and parasites, result in pneumonia. Despite the fact that there are more than 100 different strains of infectious organisms, most instances are caused by a small number of these. Almost 45% of infections in children and 15% of illnesses in adults may be mixed infections with both viruses and bacteria[10]. Despite rigorous testing, a causal substance may not be identified in roughly 50% of instances. From January 2010 to June 2012, 2259 patients were identified in five hospitals in Chicago and Nashville who had radiographic evidence of pneumonia and specimens that could be tested for the pathogen responsible. This was part of an active population-based surveillance for community-acquired pneumonia requiring hospitalization. Respiratory viruses were unexpectedly found to be more frequently detected than bacteria in samples from the majority of patients (62%) than bacteria. To be more precise, 23% of people had one or more viruses, 11% had one or more bacteria, 3% had both bacterial and viral pathogens, and 1% had a fungal or mycobacterial infection. Streptococcus pneumoniae (in 5% of patients), influenza virus (in 6% of patients), and human rhinovirus were the most prevalent pathogens.

Allergens, air pollution, and other environmental pollutants are only a few of the environmental factors that have been linked to the onset and worsening of asthma[11]. Smoking is linked to a higher risk of asthma-like symptoms both during pregnancy and after birth. Both the onset of asthma and an increase in the severity of the condition have been linked to poor air quality brought on by environmental variables like ozone or traffic pollution[12]. Exposure to indoor volatile organic compounds may be an asthma trigger; exposure to formaldehyde, for instance, has a favorable connection[13]. PVC products that include phthalates have been linked to asthma in children and adults[14, 15]. Although being exposed to pesticides is associated with the onset of asthma, a cause and effect connection has not yet been proven[16, 17].

The presence of indoor allergens is linked to asthma[18]. Dust mites, cockroaches, animal dander (particles of fur or feathers), and mould are a few of the most prevalent indoor allergies[19, 20]. Dust mite reduction initiatives have been proven to have no effect on symptoms in sensitive individuals.

II. MATERIAL AND METHODS

Twenty individuals in all with mild to moderate pneumonia were included in this study. The patients range in age from 20 to 60. Forced vital capacity (FVC) more than 75% and forced expiratory volume 1 (FEV1) were used to classify moderate pneumonia. Functional abilities refer to a patient's capacity to carry out activities of daily living even when their symptoms are not improving. Active cycle

breathing (ACBT), the six-minute walk test, and the airway questionnaire (AQ) were the fundamental treatments used to diagnose and treat asthma patients. Airways are cleared using the active cycle breathing technique, which also helps to move pulmonary secretions from the lungs. Thoracic expansion, breathing control drills, forced expiratory technique with an open glottis, and control breathing is all part of it.

Each patient had received active cycle breathing technique in accordance with established procedure. The twenty-five minute treatment session included forced expiratory method, breathing control exercises, and chest expansion exercises. Each patient had a number of sessions, three times each week, for a breathing method active cycle. The airway questionnaire was created to measure quality of life in relation to health in order to assess the impact of active cycle breathing technique on lung function and QOL. A high score on the questionnaire, which has a total of twenty items with a scoring range of 0 to 20, indicates a low quality of life. A standardized airway questionnaire [AQ20] was utilized in this study to assess health-related quality of life. On the first day of the first session and on the last day of the final session after four weeks, the patient completed the questionnaire.

The conventional technique and a climate-controlled setting were used to conduct the six-minute walk test. Patients were told to walk down a 30 meter long, clearly designated hallway with a starting and ending point. Patients were instructed to stop if they experienced an emergency, such as chest pain, pressure in the chest, dyspnea, or calf cramps. The patient's functional capacity was evaluated using a testing technique called the six-minute walk test. The patient underwent the test twice during each session, and the pre- and post-treatment distances were measured in meters. The paired t-test was used to compare the levels before and after therapy.

III. RESULTS

In this study, six adult asthmatic patients, three females and three were males. The patients were treated with active cycle breathing technique as treatment. The age of patients was between 17-60 years.

In this study there is 6 patients have been taken and mean value is about 40.020 and the standard deviation-13.600 and all the patients' age group between 17 to 60 years.

It showed that mean age of patients was 40.020±13.600. The patient's functional capacity was measure to define mild to moderate pneumonia, the value of forced vital capacity [FVC] along with forced expiratory volume [FEV1] are 67.6 and 67.3 respectively. Further results showed that the quality of life of asthmatic patient was significantly improved and paired t-test results. Comparison of pre-treatment and post-treatment AQ20 scores:

AQ20Score for pre and post treatment	Mean	SD	Std. Error Mean	95% CI	T Value	D F	Sig.[tail]
	5.24	3.2	.21	2.4	12.5	38	00

This table shows pre-treatment and post-treatment score of AQ20. The result shows that p-value for comparison of AQ20vscore is 0.000. The result indicates significant improvement in post-treatment health- related quality of life. Active cycle breathing techniques employed to pneumonia patient were also assessed by six-minute walk test. The pre and post value of six-minute walk test for four weeks in one month is discussed below:

Comparison of Six minute walk test	Week 1		Week 2		Week 3		Week 4	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
	105.0	110.8	143.5	147.7	187.6	210.5	228.8	244.6

That means for post-treatment 6MWT were 104.3±82.4 for first week, 137.6±111.8 for second week, 205.3±130.5 for third week, 234.3±123.3 for fourth week. The result showed improvement in the distances walked by patients during their four-week treatment.

IV. DISCUSSION

The purpose of the current study was to ascertain how individuals with mild to moderate asthma responded to the active cycle of breathing approach. Pre- and post-treatment evaluation of the study included the six-minute walk test and the Airway Questionnaire 20. Six patients with mild to moderate asthma received treatment using the active cycle breathing technique three times per week for one month in an effort to enhance their functional ability and quality of life. . The results demonstrated a notable improvement in the six-minute walk test and airway questionnaire scores. Many studies that demonstrated improvements in six-minute walks with functional capacity concurred with the findings of this investigation. Active cycle breathing technique was found in a comparative investigation on cystic fibrosis patients to be just as effective as postural drainage. After an active breathing cycle, an increase in functional capacity was noted. [46] Postural drainage and ACBT both showed comparable effectiveness in a trial on patients with Bronchiactesis. In comparison studies, the effectiveness of the active cycle of breathing approach has been reported. In a study, individuals with Bronchiactesis of diverse origin were compared to the effectiveness of standard treatment with the active cycle of breathing approach. The examination of the average walking

distance between groups in meters revealed a noticeable improvement. Many different physiotherapy approaches are documented and used for pulmonary rehabilitation in addition to the active cycle of breathing technique. Several studies have contrasted active cycle breathing with autogenic drainage, although there are little indications that active cycle breathing is preferable to any other method of clearing the airways. The six-minute walk test post-treatment mean for week one was 101.382.4 whereas the post-treatment mean for week four was 234.3123.3. So, during the first, second, third, and fourth weeks of treatment, there is a noticeable increase in the functional capacity of patients. Only two measuring methods, the airway questionnaire and the six-minute walk test, were used in this investigation**.**

Improvement in FEV1/FVC, FEV1, and FVC were used to gauge how effective the intervention was. According to this study, the FEV1, FVC, and modified Borg scales all improved to the same degree. However, compared to patients who used the diaphragmatic technique with postural drainage, the FEV1/FVC values in a group of patients receiving active cycle breathing technique improved more. Evidence supporting the use of the active cycle of breathing technique in people with cystic fibrosis and chronic obstructive lung disease was discovered in a systemic evaluation. In comparison to traditional chest physiotherapy, the results showed that the active cycle of breathing approach enhanced sputum production during and for up to an hour after.

V. CONCLUSION

The active cycle of breathing technique is extremely helpful as an auxiliary treatment for enhancing the health-related quality of life and functional capacity of asthmatic patients, according to this study's findings. The active breathing cycle approach is advised for usage during cardiopulmonary rehabilitation.

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