

Effectiveness of Breathing Exercise on Dyspnoea and Quality of Sleep among Patients with Chronic Obstructive Pulmonary Disease Admitted At Department Of Respiratory medicine KgmU, Lucknow

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Abstract:

Background: Health has many phases but there is no other way for optimal breathing. Oxygen is very necessary for the human body. Breathing exercises for dyspneic patients help to strengthen the breathing muscles, get more oxygen breath with less effort, and promote relaxation. The study was planned to assess the effect of breathing exercise on dyspnoea and quality of sleep among patients with COPD.

Materials and Methods: In this study quasi - experimental (one group pre and post-test) design was applied. Purposive sampling technique was used and to assign the 50 COPD patients who met the inclusion criteria. The breathing exercise was given in the morning and evening for 7 continuous days. Dyspnoea was assessed by using the mMRC dyspnoea scale and quality of sleep assessed Pittsburgh sleep quality index. The data were analyzed with the help of descriptive and inferential statistical techniques.

Results: The results revealed that mean mMRC pre test score was 3.14 ± 0.53 which after post test reduced to 2.48 ± 0.79 . So a change of 0.66 was found and this change was significant ($p < 0.001$) and the mean PSQI pre test score was 6.38 ± 3.79 which is after post test reduced to 5.22 ± 2.20 . So a change of 1.16 was found and this was significant ($p = 0.031$).

Conclusion: The study revealed that breathing exercise is an appropriate method for dyspnoea and improves the quality of sleep among COPD patients. The use of breathing exercises is a simple nursing intervention for COPD patients and modality for reliving from dyspnoea and somewhat improvement in the quality of sleep.

Key Word: Breathing exercise; Dyspnoea and Quality of sleep

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I. Introduction

“When you can't breathe, nothing else matters” is the slogan of the American Lung Association. The Person should be Staying healthy is an obligatory aspects of potent wealth. Health has many aspects but there is no alternative for optimal breathing.¹ Oxygen plays a vital role in the breathing processes and the metabolism of the living organism. The human body has a respiratory system and the main purpose of the respiratory system in the exchange of gases. The respiratory system allows the physical body to produce energy by supply the body with an endless supply of the oxygen and eliminating CO₂.² The Global Institute for Chronic Obstructive Lung Disease (GOLD) estimates that by 2020, COPD will have ranked third among the world's sixth most common causes of death and will have been the fifth disabling disease.^{3,4} COPD encompasses two types of obstructive airway disease that is chronic bronchitis and emphysema. Chronic obstructive bronchitis results from inflammation of the bronchi, leading to increased mucus production, chronic cough, and eventual scarring of the bronchial lining. In contrast to those of acute bronchitis, the clinical manifestations of chronic bronchitis continue for at least three months of the year for 2 consecutive years. Emphysema is a condition in which the walls of alveoli are destroyed. This obstruction leads to permanent over- distention of the air spaces. Because of these changes in alveoli air passes are obstructed, rather than mucus production as in chronic bronchitis.⁵ Dyspnoeic patients have reported many associated symptoms i.e. dyspnoea on exertion (DOE), tachypnea, hyperpnoea, orthopnea, paroxysmal nocturnal dyspnoea (PND) as well as chest pain, palpitation, wheezing, or cough. The major difficulties experienced during the night by dyspnoeic patients are nocturnal cough and increase 24hrs sputum volume, which causes frequent arousal and thus disturbs the sleep pattern of

the person. Symptoms related to sleep disturbances are common in moderate to severe dyspnoeic patient.⁶ George G.S. (2013) conducted a study to assess the effect of breathing exercises on quality of sleep. Pharmacotherapy alone has a limited role in relieving dyspnoea and improving the quality of sleep in the dyspnoeic patients. The complementary and alternative ways can use for insomnia includes aromatherapy, music therapy, massage therapy, breathing and relaxation technique, etc. Among these therapies, deep breathing is very effective and use full technique found to improve quality of sleep among patients with dyspnea.⁷ The Global Institute for Chronic Obstructive Lung Disease (GOLD) estimates that by 2020, breathing exercise in a patient with COPD, such as Pursed lip breathing and diaphragmatic breathing, aim to improve respiratory pattern through reducing respiratory rate.⁸

II. Material And Methods

The present study was conducted in Respiratory Medicine Ward at KGMU Lucknow, U.P. The duration of data collection for the study was November 2019- January 2020. 50 samples were considered for main study.

Study Design: One group pre-test post-test design

Study Location: The Setting of the study was the department of Respiratory in Respiratory Medicine Ward at KGMU Lucknow at King George's Medical University.

Study Duration: November 2019- January 2020

Sample size: 50 samples

Sample size calculation: In this study sample size calculated using an acceptable formula for quasi experimental study as:

$$n = \frac{(z_{\alpha} + z_{\beta})^2 (\sigma_1^2 + \sigma_2^2)}{d^2}$$

n= 50

Subjects & selection method: The population under study is COPD patients in department of respiratory medicine KGMU, Lucknow. In this study samples are the COPD patients in respiratory medicine ward, who meet the inclusion criteria and agreed to participate in the study, were selected as subjects. The subjects were selected using non- probability purposive sampling technique.

Inclusion criteria:

1. Patient who are admitted in the respiratory ward.
2. Patients who are clinically diagnosed as COPD.
3. Age group between 41 – 80 years.

Exclusion criteria:

1. Patients who were performing regular breathing exercise and yoga within 3 months.
2. Patient who have a history of recent abdominal surgery.
3. Patient with malignancies.
4. Patient with cardiac disease.
5. Patient who didn't give consent.

Procedure methodology

Tools/ Instruments- In this study following tool is used for collection of data.

Section1. Demographic variable and clinical variables

Section 2. Modified Medical Research Dyspnea Scale for assessment of dyspnea grading in COPD patients.

Modified Medical Research Dyspnea Scale was a standardized tool and available in Public Domain, which had been divided in 5 grades starting from Grade 0 to Grade 4.

Section 3 . Pittsburgh Sleep Quality Index for assessment of the quality of sleep in COPD patients.

Pittsburgh Sleep Quality index is an effective instrument used to measures the quality and pattern of sleep in COPD patients. It consists of 18 questionnaires comprising of 7 components. i.e.; sleep quality, sleep latency, and sleep duration habitual sleep efficiency, reduction in sleep disturbances, reduction in the use of sleep medication, reduction in day time dysfunction. In this Pittsburgh sleep quality index, the score was ≤ 5 that indicates good sleep and when it is more than 5 that indicates poor sleep.

Firstly the permission was obtained from the ethical committee of college then formal written permission from HOD of Department of Respiratory Medicine, KGMU Lucknow and the main study was started. The data collection duration was 3 months. The data collection was done by non probability sampling technique and all the potential participants who were meeting inclusion criteria were determined as participant/subject for the main study. Self introduction was given to the participants. After that a brief explanation about the purpose of

the study was given to the subjects. Assurance was given that the data will be utilized only for the purpose of the study. Written consent was obtained from each subject and maintained confidentiality. At first demographic detail was obtained after that assessed the dyspnoea score by using mMRC dyspnoea scale and quality of sleep score by using PSQI from the COPD patients. The investigator gave a demonstration how to do breathing exercise. The entire duration of breathing exercise was for 15 min including the rest for 3min and the investigator was with the patient during the breathing exercise procedure.

Statistical analysis

For data analysis, the statistical software SPSS (Statistical Package for Social Sciences) version 23.0 was used. Wilcoxon signed rank test was used to compare the means of both groups and chi square χ^2 test was used to test the association between demographic variables and clinical variables and pre test score. Descriptive statistics were used to describe frequencies of variables. The cut off value of level of significance was considered as $p < 0.05$.

III. Result

Section I Description of demographic variables of study group.

Table 1: Distribution of Subjects as per Demographic Variables.

n=50				
S.No.	Variables	Categories	Frequency	Percentage
1	Age	41-50	11	22%
		51-60	13	26%
		61-70	20	40%
		71-80	6	12%
2	Gender	Male	35	70%
		Female	15	30%
		Trans Gender	0	0%
3	Occupation	Unemployed	14	28%
		Professional	2	4%
		Employed Specific- Business	34	68%
4	Education	Postgraduation	3	6%
		Graduate	1	2%
		Intermediate OR Diploma	3	6%
		Highschool Certificate	8	16%
		Middle School Certificate	10	20%
		Primary school Certificate	7	14%
		Illiterate	18	36%
5	Marital Status	Married	44	88%
		Unmarried	2	4%
		Widow/Widower	4	8%

		Separated	0	0%
6	Type of House	Pakka	15	30%
		Kaccha	20	40%
		Semipakka	15	30%

Table1 – Describes about the frequency and percentage distribution of demographic variables of patients with COPD with respect to age, gender, occupation, education marital status and type of house.

Section II: Assess the effectiveness of breathing exercise on dyspnoea score and quality of sleep score.

Table 2: Pre & Post Test comparison of dyspnoea score among patients with COPD as per mMRC dyspnoea scale.

mMRC	Total Score			Wilcoxon Signed Rank Test	
	Mean	SD	Change	z-value	p – value
Pre Test	3.14	0.53	0.66	5.11	<0.001
Post Test	2.48	0.79			

n=50

Wilcoxon Signed Rank Test,* Significant

Table 2 shows the pre and post test comparison of dyspnoea score among patient with COPD. The analysis showed that there was significant ($p < 0.05$) difference in the dyspnoea score . The analysis revealed that mean mMRC pre test score was 3.14 ± 0.53 which after post test reduced to 2.48 ± 0.79 , So a change of 0.66 was found and this change was significant (0.001). That means H_0 is rejected and H_1 is accepted.

Table 3: Pre & Post Test comparison of quality of sleep score among patients with COPD as per PSQI.

PSQI	Total Score			Wilcoxon Signed Rank Test	
	Mean	SD	Change	z-value	p – value
Pre Test	6.38	3.79	1.16	2.16	0.031
Post Test	5.22	2.20			

n=50

Wilcoxon Signed Rank Test* significant

Table 3: Shows that the Pre & Post test comparison of quality of sleep score among patients with COPD as per PSQI. The analysis showed that there was significant ($p < 0.05$) difference in the PSQI score. The analysis revealed that the mean PSQI pre test score was 6.38 ± 3.79 which is after post test reduced to 5.22 ± 2.20 . So a change of 1.16 was found and this was significant ($p = 0.031$). So the researcher accepted the alternative hypothesis (H_1).

IV. Discussion

The research study had been discussed based on the objectives and the following supported studies –

Section 1: Demographic variable

Section 2: Clinical variable

Section 3: To assess the effectiveness of breathing exercises on dyspnoea and quality of sleep.

Section 1: Demographic variables

From all over study findings with selected demographic variables in the study, the finding suggested that majority of the samples (40%) were in the age group 61 – 70 years, majority (70%) of samples were male, most (88%) of the samples were married and employed (68%) majority (36%) samples were illiterates and samples (40%) belong to kaccha house.

The finding of the study was supported by the following literature:

Joshi Rashmi, Baby Leeba, conducted a study to assess the effectiveness of breathing exercises on the quality of sleep. The majority of subjects (62.0%) were males, mostly (68.0%) of the subjects were married. The duration of breathing exercise was 6 days.⁵

Helen Shaji John Cecily, Amal A. Alotaibi, conducted a study to assess the effectiveness of breathing exercises on the pulmonary function parameters and quality of life the majority of the samples (41%) were in the age group 61- 70 years. Majority of them were illiterate.⁹

Section 2: Clinical variables

The clinical profile in the study, the finding suggested that majority of the sample(44.0%) had a duration of illness between 6-10 years, tobacco/smoking was the major risk factor with 66%, 58% were not using any supportive measures, a major season of exacerbation was winter as found in 68% proportion, majority samples (40%) had smoking history, None of them were doing nothing as a breathing exercise.

The finding of the study was supported by the following literature: to assess the effectiveness of breathing exercises on the quality of sleep. The majority of subjects (70%) were not using any supporting measures, only 3 to 4% of them were doing exercise regularly.

Section 3: To assess the effectiveness of breathing exercises on dyspnoea and quality of sleep.

The finding of the study that there is a highly significant difference in the pre test and post test score of mMRC due to the effect of breathing exercise in COPD patient with p-value $p < 0.001$. Whereas, finding of the study were supported by the following literature:

A study to assess the effectiveness of breathing exercises on the pulmonary function parameters and quality of life which showed that the level of dyspnoea was significantly reduced ($p < 0.001$). so the above finding suggested that the breathing exercise is effective for dyspnoea in COPD patients.⁹

An another study that is Effectiveness of Breathing Techniques on Dyspnea among Critically Ill Chronic Obstructive Pulmonary Disease was conducted which showed that After undergoing breathing exercises in the intervention group, the mean score of dyspnea was significantly reduced ($p < 0.001$).¹⁰

Effectiveness of Controlled Breathing Techniques on Anxiety and Depression in Hospitalized Patients With COPD was conducted which showed that Controlled breathing techniques significantly improved dyspnea, anxiety, and mobility. All the measured variables improved in the intervention group. The dyspnea scores significantly improved in the intervention group ($p = .004$).¹¹ Effectiveness of breathing exercises in patients with chronic obstructive pulmonary disease was conducted the analysis showed that the mean pre-test value was 6.13 and the mean post-test value was 2.96 and significant at p value 0.001 level.¹² Effects of Breathing Exercises in Patients With Chronic Obstructive Pulmonary Disease: the study showed that respiratory rate significantly ($p \leq 0.001$) improved in the pursed-lip breathing (PLB), diaphragmatic breathing exercise (DBE), and combined BEs.¹³

The finding was compare with the supporting literature and it shown that breathing exercise is effective for dyspnoea. So the above findings suggested that breathing exercise is a effective way for COPD patients to relief from dyspnoea.

To assess the effectiveness of breathing exercise on quality of sleep and there is significant difference in the pre test and post test score of PSQI due to effect of breathing exercise in COPD patients with p value($p = 0.031$). whereas the finding of the study were supported by the following literature:

A study to assess the effectiveness of breathing exercise on the quality of sleep so there is a significant difference between the PSQI score ($p < 0.001$) after breathing exercises.⁵

An another study on Effect of yogic breathing exercise on quality of sleep in patient with chronic obstructive pulmonary disease was conducted which showed that There was a statistically significant difference between the mean PSQI scores of pre- test (9.21 ± 2.65), As the computed p value is less than 0.001.¹⁴

Ono another study on Pulmonary Rehabilitation Improves Subjective Sleep Quality in COPD which showed that After PR, the PSQI score decreased from 9.41 ± 4.33 to 7.82 ± 3.90 ($P < .001$).⁹

The finding was compare with the supporting literature and it shown that breathing exercise is effective to improve quality of sleep. So the above findings suggested that breathing exercise is a somewhat effective way for COPD patients to improve quality of sleep.

V. Conclusion

From the finding of the study, there was a significant difference in the dyspnoea score and quality of sleep score among patients with COPD after giving intervention. It has been observed that breathing exercise is beneficial on dyspnoea and quality of sleep. It is a much simple, cost-effective therapy for COPD patients and it also helps the nurses to provide holistic nursing care and prevent complications more effectively.

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