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Effectiveness of Pursed Lip Breathing Exercise on Selected Physiological Parameters among COPD Patients

Jincy Ealias[1] , Binu Babu[2]

[1, 2]Ph.D. scholar, JJT University

Abstract:***Most of the respiratory problems are chronic in nature associated with advancing age and accompanied by breathing difficulty and poor quality of life. Respiratory exercise practice facilitate for structural and physiological adaptations thus enhances survival and daily performance. The present study examines the effectiveness of pursed lip breathing exercise on physiological parameters such as respiratory rate, heart rate and peak expiratory flow rate among COPD patients residing in communities of Udupi district, Karnataka. Patients were evaluated before and after pulse lip breathing exercise using physiological parameters assessment scale. Statistical calculations were done using paired t-test and Chi-square test. The study drew the conclusion that pursed lip breathing exercise is effective in normalizing the physiological parameters such as respiratory rate, heart rate and peak expiratory flow rate among COPD patients.***

Keywords: Pursed lip breathing exercise, COPD, Physiological parameters.

1. Introduction

"When you can"t breathe, nothing else matters" is the slogan of the American Lung Association. [1] Staying healthy is an obligatory aspect of powerful wealth. Health has many phases but there is no alternative for optimal breathing. It has become clear from researches that 5-11% populations suffer from dysfunctional breathing.[2]

Chronic obstructive pulmonary disease (COPD) is an inflammatory disease of airways which results from increased resistance to airflow characterized by airway obstruction. [1]It accounts for morbidity and mortality among respiratory disease patients. COPD is the fourth foremost cause of death in the world which continues to increase in developing countries. The World Health Organization (WHO) presumes COPD to be the thirdforemost cause of death in the world by 2030.[3] In 2010, almost 24 million adults over 40 years of age in India had COPD. Half of the prevalent cases were between the ages of 40 and 60 years, which indicate that COPD is a disease of aged in India.[4]

Patients with COPD usually seek medical help only when they have an acute respiratory infection, with dyspnea as the main concern. COPD isachronic diseasenot only associatedwithdistress and low quality of life, but also an expensive disease to treat. In a resource-poor country like India, it is a challenge to curtail the growing burden of COPD. [5] Therefore prevention of development of COPD is a feasibleoption to reduce the economic burden of COPD. Breathing exercise assists the patient during rest and activity by reducing dyspnea, improving oxygenation, and maintaining normal respiratoryrate.[1]

Pursed lip breathing is a breathing exercise in which respiratory patients often learn spontaneously. In this study, COPD patients are taught to practice pursed lip breathing exercise by inhaling slowly through nose and exhalingout more slowly through pursed lips. Pursed lip breathing exercise should be practiced for 8-10 repetitions each cycle 3-4 times a day. A pursed lip prolongs exhalation thus prevents bronchiolar collapse and air trapping. It relieves shortness of breath and promotes comfort by reducing hyperventilationand increasing CO_2levelsinthealveoli. The increased CO_2 level relaxesanddilatessmoothmuscles of airway, increasesthe ratio of ventilation-perfusionandalso oxygen level intheblood.In addition,duetohealingeffectsof CO_2onlungdamage,gradualbreathingcontrolleadstoreduction in dyspnea eveninseverecasesofCOPD. [6]Thus the patient gains control over breathing, especially during exercise and at times of dyspnea.[1]

2. Literature Survey

A descriptive correlational study to assess the presence COPD among patients attending cardiology OPD was conducted at Kolkata. 86 samples were selected. Spirometry was used for detection of COPD. The study result revealed that associated COPD was found in 51.2% patients and 90.9% of cases had moderate to severe disease.[7]

A prospective epidemiological study was conducted atTamil Nadu to detect the prevalence of COPD. 9946 inhabitants who were aged 30 year or more were selected. Chest radiography and peak expiratory flow rate (PEFR) were used for data collection. The study result detected COPD among 328 patients. This study concludes that there was increased prevalence among males, heavy smokers, lower income group and women cooking for long hours using firewood and cowdung cakes.[8]

A descriptive correlational study was conducted at Mangalore, on symptoms and quality of life of patients with COPD. The sample comprised of 100 COPD patients. The dyspnea and fatigue numerical rating scales, sleep disturbance rating scale and SGRQ were used for data collection. This study reveals that there is a significant positive correlation between SGRQ score and dyspnea, sleep and fatigue. [9]

A study was conducted to evaluate the acute impact of pursed lips breathing on walking distance in COPD patients. 69 COPD patients were recruited to the study. They performed three incremental shuttle walk tests. Measures of respiratory rate (RR), breathlessness and oxygen saturation were taken before and after walks. Data was analyzed using the t-test. The study result shows that there was a significant reduction in end exercise RR and recovery time with pursed lip breathing.[10]

A study was conducted at Brazil to evaluate the influence of pursed lip breathing exercise on heart rate variationand cardiorespiratory parameters in patients with COPD. 16 subjects were assessed at rest, in seating position, under three conditions: 10 minutes of normal breathing without PLB (R1), 8 minutes with PLB (R2) and 10 minutes of normal breathing once more (R3). HR, BP, RR and SpO_2 were assessed during the trials. The study results concluded that PLB produced significant changes in HR, RR and SpO_2, and did not alter BP in subjects with COPD.[11] A study was conducted at Hong Kong to assess the effects of pursed lip breathing on dyspnea, physiological responses and sternomastoid muscle recruitment in patients with chronic obstructive pulmonary disease. 13 patients with acute exacerbation of COPD were assigned randomly into experimental and control groups. Modified Borg scale and spirometry were used for data collection. The results showed evidence that PLB is effective in relieving the dyspnoea sensation in patients with acute exacerbation of COPD.[12]

A quasi experimental study was conducted in Iran to evaluate the effects of pursed lip breathing exercise on ventilation and activities of daily living in patients with COPD. Spirogram, ABG and 20 Airway Questionnaire were used for data collection. The study result discloses that there was significant increase in oxygen saturation and activities of daily living and a decrease in $PaCO_2$ and the respiratory rate.[13]

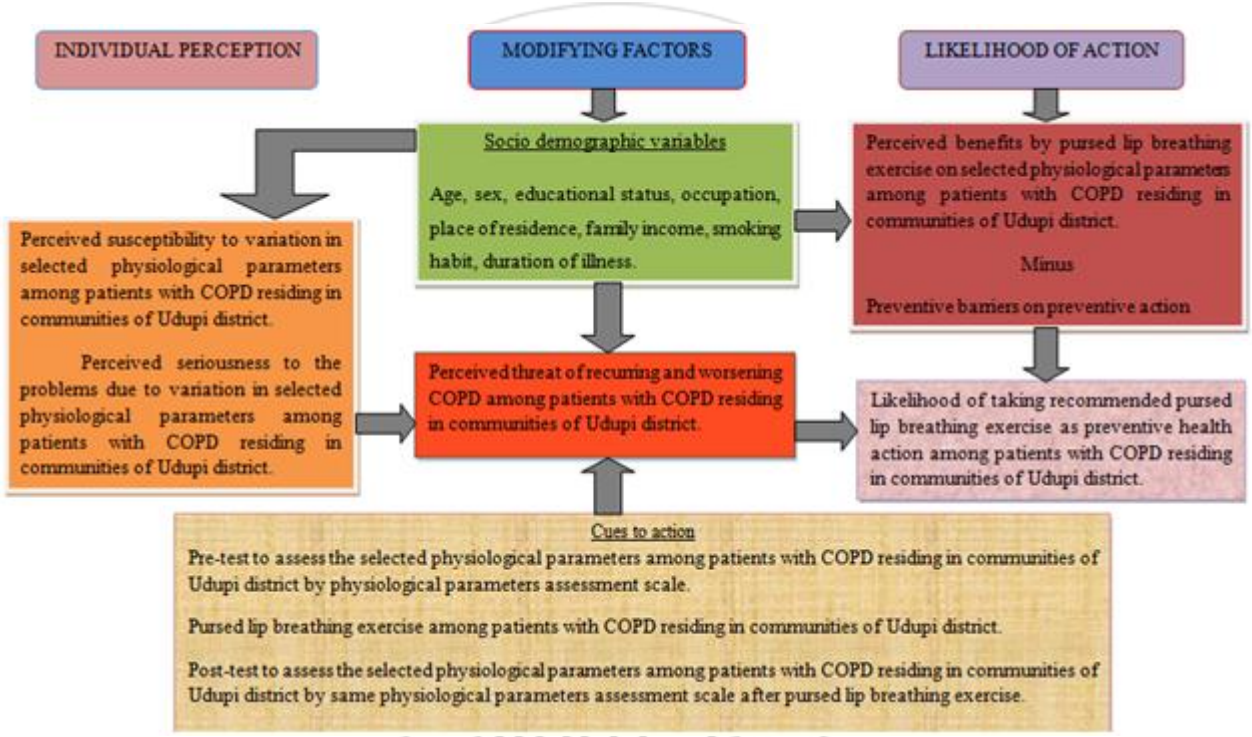

Figure 1: Modified conceptual framework based on Rosenstock"s& Becker"s Health Belief model (1984)

3. Problem Definition

"A study to evaluate the effectiveness of purse dlip breathing exercise on selected physiological parameters among patients with chronic obstructive pulmonary disease (COPD) residing in communities of Udupi district,Karnataka"

4. Methodology

An evaluative approach with pre-experimental design was used to assess the effectiveness of pursedlip breathing exercise on selected physiological parameters among COPD patients. Modified conceptual framework based on Rosenstock"s & Becker"s Health Belief model (1984) explained the whole research process (Fig 1).

Demographic proforma and physiological parameters assessment scale was the tool used for data collection. Age, sex, educational status, occupation, monthly family income, place of residence, duration of illness and smoking habit were included in demographic proforma. Heart rate, respiration rate and peak expiratory rate were the components of physiological parameters assessment scale. Three ranges have given for each component with normal, increased and decreased value. Wrist watch is used for heart rate and respiration rate estimation and peak flow meter is used for peak expiratory flow rate. The minimum score of physiological parameters assessment scale is 3 and maximum score is 9. On the basis of scoring, patient"s physiological condition is categorized as good, satisfactory and poor.

Tool validation was done by 9 experts from the field of medical and surgical nursing, physicians and biostatistics. The reliability of the tool was established using test-retest

method and was found to be 0.72. Pilot study was done on 5 COPD patients and found that it is feasible and practicable.

The main study was done on 50 COPD patients at selected communities (Koteshwara, Kumbhasi, Kundapur and Saligrama) of Udupidistrict. Permission for conducting the study was obtained from medical officers of selected PHCs. Samplewasselectedaccordingtotheinclusioncriteria using purposive sampling technique. Patients were explained about the purpose of the study and informed consent was taken. Pretest was done using demographic proforma and physiological parameters assessment scale. After pretest,pursed lip breathing exercise demonstration is done and encouraged to do the exercise daily in 3-4 times with 8-10 repetitions on each cycle.

Post test is done on the 8th day using the same physiological parameters assessment scale. Data analysis was performed using descriptive statistics in terms of frequency, percentage, mean, median and standard deviation. The pre-test and post test score of physiological parameters would also be assessed by frequency and percentage. The effectiveness of pursed lip breathing on selected physiological parameters is analyzedbypaired,t"test.Theassociationof pre-test score of selected physiological parameters with selected demographic variable is evaluated by using chi-square test.

5. Results & Discussion

In pre-test 66% (33) COPD patients had satisfactory condition, 34% (17) had poor condition and none of them were in good condition. After pursed lip breathing 90% (45) had good condition and 10% (5) had satisfactory condition. There was statistical significance ($t=16.335$, $p<0.05$) on selected physiological parameters by pursed lip breathing exercise with a significant difference in mean post test score (4.1±0.92) than their mean pre-test score (7.22±0.99). There was significant association between the pre-test score of selected physiological parameters and smoking habit among COPD patients ($\chi^2=4.37$, $p<0.05$).

Prior studies have suggested that pursed lip breathing exercise produce significant changes in heart rate, respiratory rate and SpO_2 in patients with COPD. [11] And also proposed that COPD was positively associated with age and smoking and inversely with body mass index.[14]

6. Conclusion

Despite optimal medical therapy, people living with COPD continue to experience persistent shortness of breath with their activities of daily living and therefore must engage in the long term tasks of self-management. Adequate information and education on health promotion and disease management activities will show a positive impact in both healthy and clinical populations. Pursed lip breathing exercise taught and nurtured COPD patients into an active lifestyle, where they reassumed control in their physiological parameters and dyspnea. This study will help the COPD patients to get awareness regarding pursed lip breathing exercise and responds favorably and makes appropriate physiological changes. From the finding of the study it can be concluded that pursed lip breathing exercise is effective in normalizing the physiological parameters such as heart rate, respiratory rate and peak expiratory flow rate among COPD patients.

7. Future scope

Based on the findings of the present study, recommendations offered for future research are,

- A similar study can be conducted for a longer duration.
- The study may be replicated using large sample.
- A study can be conducted using other alternative methods or techniques like deep breathing exercises, self-management education programs.
- A comparative study can be conducted to assess these verity of disease in COPD patients in rural and urban areas.
- Different research design can be used.

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Authors profile

Mrs. JincyEalias completed B.Sc Nursing and Masters in nursing (medical surgical nursing, cardiothoracic nursing) from RGUHS, Bangalore and persuing Ph.D. in nursing from JJT University, Jhunjhunu. Currently she is working as lecturer in Dr. Tanveer Malawat Nursing College, Bikaner.

Mr. BinuBabu completed B.Sc Nursing from RGUHS, Bangalore, Master"s in Business Administration in Health Care Servicesfrom SMU and Masters in nursing (medical surgical nursing, oncology)from MUHS, Nasik and persuing Ph.D. in nursing from JJT University, Jhunjhunu. Currently he is working as asst. professor in Dr. TanveerMalawat Nursing College, Bikaner.