# Mouth Mask versus Pursed Lip Breathing for Dyspnea and pulmonary Function among Chronic Obstructive Pulmonary Disease Patients

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## Abstract

**Background:** Chronic obstructive pulmonary disease (COPD) is considered a progressive respiratory disease that has a significant effect on the patient's ability to work and the quality of life. Dyspnea is considered one of the most common health problems among chronic obstructive pulmonary disease patients. **Aim:** To compare the effect of mouth mask versus pursed lip breathing for dyspnea and pulmonary function among chronic obstructive pulmonary disease patients. **Design:** A quasi-experimental design was utilized to achieve this study. **Sample**: Included purposive sample of 50 adult patients were recruited and divided into two groups as a group (1) refers to mouth mask group (n=25) and group (2) which refers to pursed-lip breathing (n=25). **Setting**: The study was applied in the form of outpatient chest clinic Fayoum University Hospital. **Tools of data collection** included (1) Socio-demographic questionnaire, (2) Measurement of pulmonary function tests sheet, (3) Measurement of the sensation of breathlessness (dyspnea) by: Dyspnea index, (4) The 3-min step test, (5) Assessment of health status in chronic obstructive pulmonary disease patient questionnaire, and (6) Mouth mask. **Results:** It revealed that there was a significant improvement and increase in forced vital capacity FVC, forced expiratory volume in one second FEV 1, and FEV1 /FVC post-intervention compared with pre-intervention. There was a decrease in dyspnea index post- mouth mask intervention group more than pursed-lip breathing group; there is improvement in the CAT score questionnaire pre and post-intervention. There was a significant decrease in dyspnea index pre and post 3min step test post-intervention. **Conclusion:** The results concluded that a mouth mask was effective for COPD patients to improve dyspnea, while pursed-lip breathing has a minimal effect on improving dyspnea. There was an improvement in the COPD Assessment Test Questionnaire (CAT) score questionnaire and Dyspnea index in COPD patients. **Recommendation**: Applying mouth mask intervention is recommended to control dyspnea and improve ventilatory functions among COPD patients.

**Keywords**: Mouth mask, Pursed-lip breathing, Dyspnea, Ventilatory functions, Chronic obstructive pulmonary disease.

## Introduction

Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortality in the United States as well as throughout the rest of the world. Chronic obstructive pulmonary disease (COPD) is considered a progressive respiratory disease that has a significant effect on the patient's ability to work and the quality of life. Dyspnea is a complex, multidimensional, subjective symptom that can significantly impact patients' QOL ((**Prevention of Acute Exacerbations of COPD, 2018**).

Deaths worldwide from COPD are approximately 3.2 million in 2017 and there was a 17.5 percent increase in deaths between 2007 and 2017, as a result of continued exposure to risk factors such as smoking and the aging population (**Halpin et al., 2019**).

The prevalence of COPD in Egypt, among high-risk Egyptian patients, was 9.6%. A higher prevalence of grade 2 was (69%) and grade 3 was (17%) and a lower prevalence of grade 1 was (3%) COPD. So increasing awareness regarding COPD in the general population and specifically among high-risk

individuals can help in the early diagnosis of this disease (**Said et al., 2015**).

Symptoms of COPD are characterized by persistent respiratory symptoms and limitation in airflow that results from the airway and alveolar abnormalities, it caused by significant exposure to noxious particles or gases (**Mirza et al., 2018**).

Patients with COPD are experienced significant dyspnea in the final year of life. It is common with advancing disease and in the late stages is present among 90-95% of those with COPD (**Belman, Botnick & Shin, 2017**). Dyspnea is a cardinal symptom of chronic obstructive pulmonary disease (COPD), the most common and debilitating symptom in COPD and it is the primary symptom that limits physical activity in more advanced diseases, and its severity and magnitude increase as the underlying disease progresses, leading to significant disability. For patients with advanced COPD, dyspnea profoundly affects the quality of life (QoL) to the extent that patients become isolated, often describing themselves as 'existing' rather than 'living (**Dorman, Byrne, & Edwards, 2017**)

It is panic attacks may lead to avoidance of physical activity, deconditioning, reduction in functional status, reduction in quality of life, and disability and anxiety in COPD (**Miravitlles et al., 2014**). Dyspnea can be treated by a variety of pharmacological and non-pharmacological interventions (**Bianchi et al., 2017**). Non-pharmacological therapies can help modify the emotional and cognitive experience of dyspnea such as oxygen masks and pursed-lip breathing training.

Pursed Lip Breathing (PLB) is an effective technique used to decrease dyspnea in COPD, improve the tolerance of activities, and improve oxygen saturation and increase ventilation and gas exchange. These improvements were observed through the increase in minutes of ventilation, increasing tidal volume, and optimization of functional lung capacity. So, better lung emptying was reported by applying pursed-lip breathing (**Hariyono et al., 2017**).

Mouth Mask was used recently instead of mouth taping that holds the aperture of mouth as of pursed-lip breathing, giving continuous feedback to the patient and decrease perioral muscle fatigue. Both taping and mask work on the same principle as pursed-lip breathing, help in maintaining the sustained effect of PLB, add more uniform resistance to the expiratory flow, prolong the breathing cycle, avoid the perioral muscle fatigue, give continuous feedback, and easier to administer. It can be used as an alternative for PLB, especially when patients find it difficult in pursuing their lips voluntarily to exhale effectively or even when PLB is required for a prolonged duration (**Maind et al., 2018**).

Mouth mask used instead of mouth taping because application of mouth taping regularly can be very difficult for the patient and removal of the tape can be painful for the patient due to its adhesive effects, so a mouth mask was designed. It has an improvement in dyspnea and functional capacity in patients who received breathing through it (**Sachdeva, Pawaria, & Kalra, 2018**).

**Significance of the study**:

Chronic obstructive pulmonary disease is considered a leading cause of morbidity and mortality worldwide. accounting for 5% of all deaths around the world, making it the third leading cause of death in the world and it is estimated that about 64 million people in the world will get COPD by 2030 (**Soriano et al., 2017 and De & Padilla, 2017** ). Chronic obstructive pulmonary disease is preventable and can be treated by a variety of pharmacological and non-pharmacological methods. Hence, the researchers conducted the study to compare the effect of using a mouth mask versus pursed-lip breathing on dyspnea and ventilatory functions among chronic obstructive pulmonary disease patients.

## Aim of the study:

To compare the effect of mouth mask versus pursed lip breathing for dyspnea and pulmonary function among chronic obstructive pulmonary disease patients through:

- Applying mouth mask intervention on dyspnea grade and ventilatory functions among COPD patients.

- Applying pursed-lip breathing technique on dyspnea grade and ventilatory functions among COPD patients.

- Evaluating and comparing the effect of mouth mask versus pursed-lip breathing techniques on dyspnea grade and ventilatory functions among COPD patients

### Hypothesis

Adult patients who are receiving mouth masks will have a lower grade of dyspnea and an increase in ventilatory functions than those who receiving pursed-lip breathing techniques.

## Subjects and Methods:

### Research design:

The quasi-experimental research design was utilized to meet the aim of the present study. Quasi-experimental research is a prospective or retrospective study in which patients self-select or are selected into one of some different treatment groups to compare the real effectiveness and safety of non-randomized treatments **(Maciejewski, 2019).**

### Settings:

The study was applied in the form of an outpatient chest clinic at Fayoum University Hospital. The inpatient chest department has a capacity of 40 beds for male patients and twenty-six beds for female patients. The chest department has a lab for pulmonary function tests. These settings were selected due to the high prevalence of patients in the selected settings and also, it serves the biggest region of the population from both rural and urban areas

### Subjects:

A purposive sample of 50 adult patients diagnosed with COPD was selected based on **Epi info7** program that was used to estimate the sample size using the following parameters: Total population at the above-mentioned hospital was 281patients 2019, expected frequency =90%, accepted error = 10%, confidence coefficient =95%, estimated sample size = 50 patients with COPD.

- **Inclusions criteria:** The patients were selected according to the following criteria:

- Adult patients who able to communicate.
- Grade C of COPD stages

They were assigned in two groups equally, 25 adult patients in each group:

- Group (A): Consisted of 25 adult patients were used by expiratory breathing through mouth mask in addition to, standard chest physiotherapy.

- Group (B) consisted of 25 adult patients were used pursed-lip breathing with a standard chest physiotherapy program was for four days per week for six weeks.

### Tools for data collection:

Six tools were used for data collection as the following:

**Tool I: The patient's demographic questionnaire** was developed by the researchers after reviewing the related literature and research studies **(Prevention of Acute Exacerbations of COPD, 2018 and Global Initiative for Chronic Obstructive Lung Disease, 2019),** it included age, sex, educational level, marital status, occupation, and residence.

**Tool II: Measurement of pulmonary function tests sheet:** Measurement of pulmonary function tests by spirometer to assess pulmonary function tests forced vital capacity (FVC), forced expiratory volume in one second (FEV 1) (Jaeger Vyntus IOS spirometer was used) pre and post-intervention.

**Tool III:** Measurement of the sensation of breathlessness (dyspnea) by: Dyspnea index (fifteen count breathlessness score): The patient was asked to take deep initial breathe and count from 1 to 15 within about 8 seconds and the therapist counted how many breathes that the patient took in between to complete the counting (**Steinhorn, 2018**). This index was performed when the patient was at rest and immediately after the 3-minute step test.

**Tool IV:** The 3-min step test: The patient was asked to step up and down a single step which was 20cm high 22cm in depth. The stepping rate was between 14 and 16 steps per min for 3min (**Borel et al., 2016**).

**Tool IIV:** Assessment of health status in COPD patient by: COPD Assessment Test Questionnaire. CAT Questionnaire consists of 8 questions and scores of each question range from 0 to 5, total scores range from 0 to 40 (**POS-GRADUAÇAO, 2018**). The higher the score means the more severity of the disease. The score was recorded pre-intervention and post inter intervention and changes in the score were calculated by statistical analysis.

**Scoring:**

Range of CAT scores from 0–40. Higher scores denote a more severe impact of COPD on a patient's life. The difference between stable and exacerbation patients was five units. No target score represents the best achievable outcome.

**Tool IIIV:** Mouth mask:

The mask was designed in a way that only the central aperture, (only 1/4 that of the total lip length is kept open). All patients who received mouth masks were asked to wear the mask and demonstrate the breathing pattern, Inhale from the nose and exhale from the mouth (**Sachdeva, Pawaria, & Kalra, 2018**).

**Validity of the tools:**

Tools were submitted to five experts in the field of chest diseases, and medical-surgical nursing to test for face validity and the necessary modifications were carried out**.**

**Reliability of the tools:**

The reliability of tools was tested using Cronbach's alpha. The reliability coefficient for tool I was (0.89), tool II was (0.92), tool III was (0.84), tool IV was (0.83), and tool IIV was (0.81), which means all tools were reliable.

**Methods:**

An official letter from the Faculty of Nursing was obtained and directed to the general director of Fayoum University Hospital and to the Head of the Chest outpatient clinic after a complete explanation of the study aim to obtain permission to carry out the study.

**Pilot Study:**

A pilot study was done on 10% of the sample (5 adult patients to test the feasibility and applicability of different items of the tool to establish the most practical and comprehensive way of obtaining necessary data. Adult patients included in the pilot study were excluded from the actual study.

**Data collection procedures:**

- Approval of the Ethical Research Committee of the Faculty of Nursing was obtained before conducting the study.

- After obtaining the administrative approval, data were collected from February to July 2019. Researchers attended the previously mentioned setting two days per week, from 9 am to 1 pm and interviewed with patient through face to face intervew.

- Implementation of the study was carried out through four phases (assessment, planning phase, implementation phase, and evaluation phase).

**I. Assessment Phase:**

- **Initial assessment:** was carried out to collect baseline data for both groups using the tool I, II, III, IV, IIV, and IIIV. It was done one-month post sessions for both groups to evaluate the effect of the interventions either mouth mask or pursed lip breathing on adult patients' dyspnea grade and ventilatory functions.

**II. Planning phase:**

Based on the collected data during the assessment phase and literature review, the mouth mask and pursed-lip breathing interventions goals, priorities, contents, and expected outcomes were developed by the researchers.

- Goals and expected outcome of the intervention:

  - The practice of mouth mask sessions.

- The practice of pursed-lip breathing exercise.

- Decreasing grade of dyspnea.

### III. Implementation phase:

- The mouth mask or pursed-lip breathing exercise interventions were applied individually for each patient in the chest outpatient clinic in the waiting hall. Patients divided in two groups (A &B).

- In group (A) which demonstrated mouth mask, the researchers asked the patients to be in a comfortable position, then asked them to wear the mask and inhale slowly through his nose for two counts, then the researchers asked the patient to hold their breath for the account of three, finally, the patients were asked to exhale slowly and gently not do forceful exhalation through the mask. Researchers were asked patients to repeat the technique until they were assured that the patient had gained full skills.



- In group (B) which demonstrated pursed-lip breathing: the researchers asked the patients to be comfortable position and then asked them to relax their neck and shoulder muscles. Then inhale slowly through his nose for two counts, while keeping his mouth closed. The patients held their breath for the account of three and informed to pucker or purse his lips as if trying to whistle or gently flicker the flame of a candle. Then exhale slowly and gently through the pursed-lip while counting to four.

- Patients were asked to repeat pursed-lip breathing techniques until the researchers were assured that the patient had gained full skills.

- IN both groups the researchers asked the patient to start with quiet breathing for 3 repetitions and take rest for 5 seconds, then performed diaphragmatic breathing for 3 repetitions, then took rest for10 seconds, and finally performed pursed-lip breathing for 8 repetitions (with 5-second rest between every 4 repetitions of PLB). During the first week, the patient was done 3-4 sets per one session with one-minute rest between each set, number of sets increased gradually till reached 4 sets at the last of the week (**Ealias & Babu, 2016**).

### IV. Evaluation phase:

- Every adult patient in both groups follow up was re-evaluated after four weeks to evaluate the effect of interventions on dyspnea grade and ventilatory functions using the same pretest study tools (II, III, IV, and IIV).

- The comparison was done between the two groups to identify the effect of the mouth mask versus pursed-lip breathing on dyspnea grade and ventilatory functions.

### Ethical considerations:

Written informed consent was obtained from each adult patient after explaining the aim of the study. Privacy and confidentiality for each adult patient were assured. The patient's right to be withdrawn at any time from research participation.

### Data processing and Statistical analysis

After data were collected and transferred into specially design formats, to be suitable for computer feeding. Data were processed and analyzed using PC with Statistical Package for Social Sciences (SPSS ver.18). Descriptive statistics**:** Mean median and standard deviation: used for describing and summarizing the quantitative variable. Count (numbers) and percentage from total: used for describing and summarizing qualitative variables. Analytical statistics**:** Cronbach's Alpha reliability test: It was used to measure the reliability of all tools. Its maximum value is ($\alpha = 1.0$) and the minimum accepted value is ($\alpha = 0.7$); below this level, the tool would be unreliable. Comparisons between both groups were carried out using the Mann-Whitney U test for the

quantitative variable and chi-square, Monte Carlo tests for qualitative variables. All results were interpreted at a 5% level of significance (P-value is considered statistically significant if was P≤0.05).

## Result:

**Table (1)** revealed that more than half (60% and 52%) of the adult patients in the mouth mask group and PLB group aged from 50-55 years old respectively. 96% in the mouth mask group and 100% in the PLB group were males, with a highly statistically significant difference was found ($X^2$ =1.036, P.000). Concerning the education level, it was observed that (48%) of the adult patients were read and write in mouth mask group and PLB group, with no statistically significant difference (p= 1.456). In addition, 100% and 96% in the mouth mask group and PLB group were married, with no statistically significant difference ($X^2$= 1.020, P=0.663). Regarding occupation, it was noticed that the majority of adult patients (64% and 80%) had manual work in mouth mask and PLB groups respectively, with no statistically significant difference ( $X^2$= 1.028, P=0.563).

**Table (2):** Represented that there was no significant difference found in FEV 1, FVC,

FEV1 /FVC, and CAT between both groups pre-intervention (p>0.05). There was a significant increase in FEV 1, FVC, and FEV1 /FVC post-intervention compared with that pre-intervention in the mouth mask group and BLP group (p<0.001). A significant decrease in CAT was found post-intervention compared with that pre-intervention in the mouth mask group and BLP group (p <0.001).

**Table (3):** Represented that there was no significant difference found in CAT total score between both groups pre-intervention (p>0.05). There was a significant decrease in CAT total score was found post-intervention compared with that pre-intervention in the mouth mask group less than in BLP group (p <0.001), which reflect positive effect of intervention.

**Table (4):** There was no significant difference in mean value dyspnea index between pre and post 3 minutes between both groups pre-intervention (p>0.05). There was a significant decrease in mean value dyspnea index between pre and post 3 minutes post-intervention in the mouth mask group was less than in BLP group compared with that pre-intervention ( p<0.001).

**Table (1):** Distribution of adult patients with COPD in both study groups regarding their socio-demographic data

| Items | Mouth mask group A (n=25) | | PLB group B (n=25) | | X2 | P |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | | |
| **Age** | | | | | | |
| 50-< 55 | **15** | 60 | 13 | 52 | 1.065 | 1.453 |
| 55- ≤ 60 | **10** | 40 | 12 | 48 | | |
| **Sex** | | | | | | |
| Male | 24 | 96% | 25 | 100% | 1.036 | P= .000* |
| Female | 1 | 4% | 0 | 0% | | |
| **Educational level** | | | | | | |
| Illiterate | 11 | 44% | 10 | 40% | 1.065 | 1.453 |
| Read &write | 12 | 48% | 12 | 48% | | |
| Primary school | 2 | 8% | 3 | 12% | | |
| **Marital status** | | | | | | |
| Married | 25 | 100 | 24 | 96 | 1.020 | 0.663 |
| Single | 0 | 0 | 1 | 4 | | |
| **Occupation** | | | | | | |
| Housewife | 9 | 36% | 5 | 20% | 1.028 | 0.563 |
| Manual work | 16 | 64% | 20 | 80% | | |

**Table (2):** Mean values of FEV 1, FVC, FEV1 /FVC, and CAT pre and post-interventions in mouth mask group and PLB group

| | Mouth mask group (n=25) Mean+SD | PLB group (n=25) Mean+SD | T-test | P |
|---|---|---|---|---|
| **FEV1 (L):** | | | | |
| Pre-intervention | 1.5±0.36 | 1.49±0.35 | 2.18 | 0.03* |
| Post-intervention | 2.03±0.5 | 1.83±0.43 | | |
| **FVC (L):** | | | | |
| Pre-intervention | 2.64±0.32 | 2.75±0.41 | 9.23 | 0.0001* |
| Post-intervention | 3.15±0.46 | 3 ±0.41 | | |
| **FEV1/FVC (%):** | | | | |
| Pre-intervention | 53.71±9.83 | 54.8±10.15 | 6.45 | 0.0001* |
| Post-intervention | 64.17±9.4 | 58.57±12.47 | | |

**Table (3):** Mean values of CAT pre and post-interventions in mouth mask group and PLB group

| | Mouth mask group (n=25) Mean+SD | PLB group (n=25) Mean+SD | T-test | P |
|---|---|---|---|---|
| **CAT:** | | | | |
| Pre-intervention | 32.64±4.32 | 33.2±3.07 | 12.32 | 0.0001* |
| Post-intervention | 12.65±4.09 | 17.87±7.1 | | |

**Table (4):** Mean values of dyspnea index pre and post-interventions in mouth mask group and PLB group

| | Mouth mask group (n=25) Mean+SD | PLB group (n=25) Mean+SD | T-test | P |
|---|---|---|---|---|
| **Dyspnea index pre 3 minutes intervention:** | | | | |
| Pre-intervention | 2 | 2 | 3.76 | 0.0001* |
| Post-intervention | 0 | 1 | | |
| **Dyspnea index post 3 minutes intervention:** | | | | |
| Pre-intervention | 3 | 3 | 4.83 | 0.0001* |
| Post-intervention | 1 | 1.5 | | |

## Discussion

Chronic obstructive pulmonary disease (COPD) is a collection of diseases with different causes, mechanisms, and physiological effects. It can be prevented and treated disease (**Mirza et al., 2018**). Dyspnea is treated with a variety of pharmacological and non-pharmacological interventions such as mouth mask and pursed lips breathing (PLB) is a ventilatory strategy frequently adopted by adult patients diagnosed with chronic obstructive pulmonary disease (COPD) to relieve dyspnea. These interventions were found to be effective in improving ventilatory functions and reduce dyspnea.

Results of the current study highlighted that the majority in the mouth mask group and all patients in the PLB group were males. This result is in the same line with **Al Ghobain, Al-Hajjaj, & Wali, (2017)** who studied in Saudi Arabia "Prevalence of chronic obstructive pulmonary disease among smokers attending primary healthcare clinics" and found that more than two-thirds of men were twice as affected. This result is contradicted with (**Global Initiative for Chronic Obstructive Lung Disease, 2019**) which stated that COPD affected men and women almost equally. From the researchers' point of view, this high percentage of male gender attributed to their smoking.

Concerning the education level, findings of the current study indicated that less than half of the adult patients were read and write in mouth mask group and PLB group. This finding matches with **National Clinical Guideline Centre, (2018)** that found that the risk factors for

COPD were low educational levels. **Nizankowska-Mogilnicka, Mejza & Buist, (2017)** conducted a study in Malopolska about "Prevalence of COPD and tobacco smoking" and reported that a low level of education is linked with a higher prevalence of COPD.

Findings of the current study presented that there was a significant increase in FEV 1, FVC, and FEV1 /FVC post-intervention compared with that pre- intervention in the mouth mask group and BLP group (p<0.001). This result is supported by **Sade et al., (2019)** who found in their study titled "Efficacy of Pulmonary Exercises in Chronic Obstructive Pulmonary Disease" that breathing strategies including pursed-lip breathing, diaphragmatic breathing has a significant increase in FEV1 /FVC values.

The findings of the current study illustrated that a significant decrease in CAT was found post-intervention compared with that pre-intervention in the mouth mask group and BLP group (p <0.001). This reflected the positive effects of mouth masks and PLB in improving ventilatory functions and decrease dyspnea. This result comes in agreement with the study done by **Smid et al., (2017)** who studied "Responsiveness and MCID estimates for CAT, CQC, and HADS in patients with COPD undergoing pulmonary rehabilitation" and found that mouth mask has a positive effect and improving the CAT score.

Similary, **Lin, et al., (2019)** studied "Effects of breathing exercises using home-based positive pressure in the expiratory phase in patients with COPD" and reported that using mouth masks among patients with severe COPD was a benefit in improving the CAT score and health status.

Also, **Shivangi, Sonia, & Sheetal, (2018)** who studied "Effect of Pursed Lip Breathing and Mouth Mask on Dyspnea in Healthy Individuals who found that mouth mask can be used to improve ventilatory functions and decrease dyspnea as an alternative to pursed-lip breathing."

The findings of the current study showed that there was a significant decrease in dyspnea index between pre and post 3 minutes post-intervention in the mouth mask group and BLP group compared with that pre-intervention ( p<0.001). From the researchers' point of view, this is attributed to the importance of mouth mask intervention and indicates the success of mouth mask intervention than PLB intervention was used to decrease the dyspnea among adult patients with COPD

This result is supported by the study done by **Sachdeva, Pawaria, & Kalra, (2018)** about "Effectiveness of Pursed Lip Breathing Versus Mouth Mask on Dyspnea and Functional Capacity in Acute Exacerbation of Chronic Obstructive Pulmonary Disease" and found that mouth masks showed significantly higher improvement in relieving dyspnea and in increasing the functional capacity. Similarly, the study conducted by **Maind et al., (2018)** about the comparison between the effect of pursed-lip breathing and mouth taping on dyspnea reported that mouth mask and PLB was effective in improving the response to post-test dyspnea status and vital parameters

Also, **Sari, (2016)** who studied the Effect of self-efficacy pursued lip breathing to decrease tightness and improved oxygen saturation in patients with COPD and reported that mouth mask causes more statistically significant improvement in relieving dyspnea.

## Conclusion:

Based on the findings and hypotheses of the current study, it was concluded that patients who received and demonstrated mouth mask their ventilatory functions have been improved, decrease dyspnea grade than pursed-lip breathing group**.** Also**,** there was an improvement in the CAT score questionnaire among patients with chronic obstructive pulmonary disease.

## Recommendation:

In light of the current study results, the following recommendations are proposed:

* Training programs regarding applying mouth masks should be educated for all nurses.

* A training program during rehabilitation should be provided for all adult patients to encourage them to apply mouth masks.

- Future research includes replication of the current study on a large group to be generalized.

# References

Al Ghobain, M., Al-Hajjaj, M.S., & Wali, S.O. (2017): Prevalence of Chronic Obstructive Pulmonary Disease Among Smokers Attending Primary Healthcare Clinics in Saudi Arabia. *Ann Saudi Med*; 31:129–33

Belman, M.J., Botnick, W.C., & Shin, J.W. (2017): Inhaled Bronchodilators Reduce Dynamic Hyperinflation During Exercise in Patients with Chronic Obstructive Pulmonary Disease. *Am J Respir Crit Care Med*; 153:967-75

Bianchi, R., Gigliotti, F., Romagnoli, I., Lanini, B., Castellani, C., & Grazzini, M. (2017): Chest wall Kinematics and Breathlessness During Pursed-Lip Breathing in Patients with COPD. *Chest*; 125(2):459–65.

Borel, B., wilkinson-Maitland, C.A., Hamilton, A., Bourbeau, J., Perrault, H., Jensen, D., & Maltais F. (2016): Three-Minute Constant Rate Step Test for Detecting Exertional Dyspnea Relief After Bronchodilation in COPD, *International Journal of Chronic Obstructive Pulmonary Disease*, 11, 2991.

De, M.M., & Padilla, J. (2017): Global Initiative for Chronic Obstructive Lung Disease (GOLD)-2017: La visión desde alat. Archivos de bronconeumología:Organo oficial de la Sociedad Española de Neumologíay Cirugía Torácica SEPAR y la *Asociación Latinoamericana de Tórax* (ALAT), 53 (3): 87-8.

Dorman, S., Byrne, A., & Edwards, A. (2017): Which Measurement Scales should We Use to Measure Breathlessness in Palliative *Palliat Med*; 21(3):177-9.

Ealias, J. & Babu, B. (2016): Effectiveness of Pursed Lip Breathing Exercise on Selected Physiological Parameters among COPD Patients. *International Journal of Science and Research*, 5 (5): 19-22.

Global Initiative for Chronic Obstructive Lung Disease (GOLD) (2019): Global Strategy for The Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease.

Halpin, D.M., Celli, B.R., Criner, G.J., Frith, P., Varela, L., Salvi, S. & Aisanov, Z. (2019): It is Time for The World to Take COPD Seriously: A Statement from The GOLD Board of Directors. European Respiratory Journal, 54: 190091.

Hariyono, R., Santoso, S.D.R.P., Arsa, P.S.A. & Rozi, F. (2017): The Influence of Pursed Lip Breathing on Dyspnea, Oxygen Saturation and Activity Tolerance on COPD Patient: Systematic Review. In 8th International Nursing Conference on Education, *Practice and Research Development in Nursing*.

LIN, Q., ZHUO, L., Wu, Z., LI, C., ZHOU, M., & CAI, C. (2019): Effects of Breathing Exercises Using Home-Based Positive Pressure in The Expiratory Phase in Patients with COPD. *Postgraduate Medical Journal*, 95 (1127): 476-81.

Maciejewski, M. (2019): Quasi-Experimental Design. Biostatistics & Epidemiology; 4 (1): 38-47.

Maind, G., Nagarwala, R., Retharekar, S., Gondane, S., Bedekar, N., shyam A. & Sancheti, P. (2018): Comparison between The Effect of Pursed-Lip Breathing and Mouth Taping on Dyspnea: A Cross-Sectional Study, *International Journal of Current Research and Review*, 7 (16), 17.

Miravitlles, M., Worth, H., Soler, Cataluña, J., Price, D., De Benedetto, F., Roche, N., & Ribera, A. (2014): Observational Study to Characterize 24-Hour COPD Symptoms and Their Relationship with Patient-Reported Outcomes: Results from the ASSESS Study. *Respiratory Research*, 15 (1): 122.

Mirza, S., Clay, R.D., Koslow, M.A. & Scanlon, P.D. (2018): COPD Guidelines: A Review of The GOLD Report, *In Mayo Clinic Proceedings* (Vol. 93, No. 10, pp. 1488-502).

National Clinical Guideline Centre (2018): Chronic Obstructive Pulmonary Disease: Management of Chronic Obstructive Pulmonary Disease in Adults in Primary and Secondary Care. www.nice.org.uk/guidance/cg101/resources/guidance-chronic-obstructive-pulmonary-disease-pdf.

Nizankowska-Mogilnicka, F., Mejza, A.S. & Buist, S. (2017): Prevalence of COPD and Tobacco Smoking in Malopolska region—results from the BOLD study in Poland Pol *Arch Med Wewn*, 117 (9), 402-10.

POS-GRADUAÇAO, P. (2018): Is the COPD Assessment Test Sensitive for Differentiating COPD Patients from Active Smokers and Nonsmokers without Lung Function Impairment? *A population-Based Study*, 44 (3): 213-9.

Prevention of Acute Exacerbations of COPD (2018): American College of Chest Physicians and Canadian Thoracic Society Guideline Available at: https://www.sciencedirect.com/science/article/pii/S0012369215389418 retrieved on 12/9.

Sachdeva, S., Pawaria, S. & Kalra, S. (2018): Effectiveness of Pursed Lip Breathing Versus Mouth Mask on Dyspnea and Functional Capacity in Acute Exacerbation of Chronic Obstructive Pulmonary Disease. *International Journal of Health Sciences & Research*, 94 (8): 9.

Sadei, S.¸ Irintas¸ E., Inanir, M., Çekmece, Ç. & Basyig, A. (2019): Efficacy of Pulmonary Exercises in Chronic Obstructive Pulmonary Disease. *Kocaeli Universities Saglık Bilimleri Dergisi*, 6 (1): 39-44.

Said, A.F., Ewis, A.A., Omran, A.A., Magdy, M.E. & Saleeb, M.F. (2015): Prevalence and Predictors of Chronic Obstructive Pulmonary Disease Among High-Risk Egyptians. *Egyptian Journal of Bronchology*, 9 (1): 27.

Sari, N.K. (2016): Effect of Self-Efficacy Pursed-Lip Breathing to Decrease Tightness and Improved Oxygen Saturation in Patients with COPD. *International Journal of Medical Research and Health Sciences*; 5(3): 17-21.

Shivangi, S., Sonia, P., & Sheetal, K. (2018): Effect of Pursed Lip Breathing and Mouth Mask on Dyspnea in Healthy Individuals-A Pilot Study, *International Journal of Health Sciences & Research (www.ijhsr.org)* 138 Vol.8.

Smid, D.E., Franssen, F.M., Houben-wilke, S., Vanfleteren, L.E., Janssen, D.J., Wouters, E.F., & Spruit, M.A. (2017): Responsiveness and MCID Estimates for CAT, CQC, and HADS in Patients with COPD Undergoing Pulmonary Rehabilitation: A Prospective Analysis. *Journal of The American Medical Directors Association*, 18 (1): 53-8.

Soriano, J.B., Abajobir, A.A., Abate, K.H., Abera, S.F., Agrawal, A., Ahmed, M.B. & Alam, N. (2017): Global, Regional, and National Deaths, Prevalence, Disability-Adjusted Life Years, and Years Lived with Disability for Chronic Obstructive Pulmonary Disease and Asthma, 1990-2015: A Systematic Analysis for The Global Burden of Disease Study 2015. The *Lancet Respiratory Medicine*, 5 (9): 691-706.

Steinhorn, D.M. (2018): Pulmonary Symptom Management in Adults and Children with Oncologic Disease. Handbook of Supportive Oncology and Palliative Care: *Whole Person and Value-based Care*, 85.