IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 8, Issue 6 Ser. I. (Nov - Dec .2019), PP 67-72
www.iosrjournals.org

The Effect of Six Minute Walk Test and Pursed-Lip Breathing on Anxiety Caused by Dypsnea in Patients with Stable Chronic Obstructive Pulmonary Disease (COPD) at University of Sumatera Utara Hospital

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Abstract: *Physiological changes due to inflammation in patients with stable chronic obstructive pulmonary disease (COPD) significantly reduce low levels of carbon dioxide in the blood which can trigger emotional symptoms of anxiety and decreased activity, physical exercise that can improve lung functional capacity and dyspnea management are recommended six minute walk test exercises and pursed-lip breathing in patients with stable COPD. The objective of the research was to identify the effect six minute walk test and pursed-lip breathing on anxiety caused by dypsnea in patients with stable COPD. The research used quasi experimental method with pre and post test control group design. The samples were 70 respondents; 35 respondents in the intervention group and 35 respondent in the control group, using State-Trait Anxiety Inventory (STAI) instrument. The result of the research showed that there was the effect in the control group and intervention group in six minute walk test and pursed-lip breathing on anxiety caused by dypsnea in patients with stable COPD at p-value = 0.000, and in the control group at p-value = 0.763. The conclusion was that six minute walk test and pursed lip-breathing had significant effect on anxiety caused by dypsnea in patients with stable COPD.*
Keywords: *Six Minute Walk Test, Pursed-Lip Breathing, Anxiety, Dypsnea, Chronic Obstructive Pulmonary Disease (COPD)*

Date of Submission: 25-10-2019 Date of acceptance: 09-11-2019

I. Introduction

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the world, and will increase in the coming decades, its prevalence and estimated mortality associated with COPD are very significant and are one of the most common reasons for hospitalization (Dajczman et al., 2015). Based on epidemiological studies there are an estimated 384 million COPD cases, with a prevalence of 11.7% globally, there are around three million deaths each year, the prevalence of deaths due to COPD is expected to continue to increase in the next few years to 4.5 million deaths each year (GOLD, 2018).

The incidence of COPD in Indonesia according to Basic Health Research (Ministry of Health, 2013) states that the COPD prevalence is 3.7 percent per mile, with a higher prevalence in males at 4.2% (Riskesdas, 2013). Patient data at the University Hospital of North Sumatra stated that total COPD 2018 patients were 786 people, with a higher prevalence occurring in males as many as 603 people (88.6%) (University of Sumatera Utara Hospital Medical Records, 2018).

Chronic obstructive pulmonary disease (COPD) causes pulmonary physiological changes, resulting in decreased oxygen supply as indicated by saturation (SpO2) in COPD patients (Sitinjak, Hastuti and Nurfianti, 2016). Physiological changes due to inflammation associated with COPD cause depression and anxiety in patients, acute hyperventilation significantly decreases carbon dioxide levels in the blood, lower carbon dioxide levels reduce blood flow to the brain, which can trigger emotional symptoms including anxiety (Yohannes, Junkes, Smith and Vestbo, 2017). People with COPD will experience unstable emotional disturbances, low coping strategies, anxiety disorders, depression, feelings of helplessness, fatigue, feelings of loss of freedom and movement activities (Volpato, Banfi, Rogers and Pagnini, 2015).

Research conducted by Strang, Ekberg-Jansson and Henoch (2014) most patients experienced anxiety related to COPD, the analysis revealed three things that were worried by COPD patients, anxiety about death, anxiety of survival, and loss of joy due to anxiety. The majority of patients experience anxiety, limiting their lives to activities. Living with severe COPD creates feelings of helplessness and anxiety about how to deal with life and all its challenges.

Various rehabilitation programs developed from many studies have been applied, but standard exercise programs for patients with chronic lung disease have not been established. The most important part of rehabilitation is aerobic exercise, a typical aerobic exercise is walking. Walking is a systemic exercise, and most daily activities involve walking. As such, it is considered an exercise suitable for COPD patients (Kim, 2003).

Six minute walk test exercise is a physical exercise that is recommended internationally because this exercise is easy to do, rehabilitation using a six minute walk test resembles daily activities, and reflects directly the pulmonary function and exercise ability of patients while carrying out daily activities (American Thoraci Society, 2002).

Physical exercises and breathing exercises such as walking can stimulate increased release of endorphins, these hormones have a direct psychological impact which is to help provide a feeling of relaxation, reduce tension, increase feelings of pleasure, make a person more comfortable, and launch a supply of oxygen to the muscles (Sitinjak, 2016).

According to PDPI (2003) mapping breathing exercises in COPD patients who are recommended to control dyspnea, the pursed-lip breathing exercise technique is useful to improve ventilation and synchronize the work of the abdominal and thoracic muscles. pursed-lip breathing is a breathing exercise that consists of two mechanisms, namely breathing inspiration) with the mouth closed a few seconds through the nose and exhale (expiration) slowly through the mouth with a pursed lip pattern like a whistling position (Hudak and Gallo, 2011).

Research conducted by Pooja and Vinita (2017) where the results of this study show rehabilitation interventions using a six minute walk test can help significantly reduce dyspnea (p-value < 0.001) and improve quality of life in COPD patients. Research conducted by Kim, E. , Kim, and Lee (2014) stated that there was a difference in the decrease in anxiety scores due to dypsnea in patients who took the Six Minute walk test intervention, which statistically showed a significant difference, the score of the experimental group decreased from 2.89 to 2.69 while the control group increased from 2.92 to 3.15, which is statistically significant difference (p-value < 0.05). Subjects who did the six minute walk test showed decreased anxiety about dipsnea compared with those who did not do the exercise.

Research conducted by Sellares et al., (2011) breathing exercises and physical exercise can help reduce breathing work and increase oxygen saturation, can relieve breathing muscles at a minimum, with breathing exercises can optimize lung function, and reduce anxiety due to tightness. Respiratory exercise has a significant effect on dyspnea, and anxiety, in the intervention group there was a significant decrease in anxiety (p-value = 0.004) in COPD patients, a higher decrease in value was found in anxiety scores from 2.38 to 1.25

Physical activity will result in an increase in residual pulmonary volume thereby reducing alveolar ventilation during exercise, affecting oxygen diffusion thereby limiting functional capacity in individuals. Increased oxygen levels in the lungs will help COPD sufferers to reduce or control dipsnea, so as to reduce patient anxiety (Damle, Shetye and Mehta, 2016). Rehabilitation of coordination between physical training and breathing exercises.

Rehabilitation of COPD patients can be done physical exercise and breathing exercises, physical exercise can stimulate increased release of endorphins, these hormones have a direct psychological impact on making a person more comfortable. Breathing exercises in COPD patients who are recommended to control dyspnea, the pursed-lip breathing exercise technique are useful to improve ventilation and synchronize the work of the abdominal and thoracic muscles. There are also results of studies that say that the provision of physical exercise six minute walk test is more effective against reducing anxiety compared to those who do not do physical exercise. The problem that can be raised in this study is whether there is an effect of the Six Minute Walk Test and pursed-lip Breathing on anxiety reduction due to dyspnea in COPD patients.

II. Method

This type of research used quantitative research with the research design used in this study is to use a pretest - posttest with control design design that is a study that manipulates the independent variable with two interventions. According to Polit and Back (2012) quasi experimental is a research design in which treatment is given to a group, then observations are made before and after the intervention. This study uses one intervention group combined in the study that there are no variables to compare. The design of this study recognizes the effect of six minute walk test and pursed-lip breathing on anxiety due to dypsnea in COPD patients, in this study researchers compared pre and post after intervention.

This research was conducted at Polyclinic at University of Sumatera Utara Hospital, Medan. This research was conducted in April to May 2019. The population in this study were all COPD patients who were outpatients at University of Sumatera Utara Hospital, Medan. The sampling technique used is nonprobability sampling with a sampling method that is consecutive sampling. This method is a sample selection method which is done by selecting all individuals who meet and meet the sample criteria until the desired number of samples are met (Polit and Beck, 2012).

Inclusion criteria in this study are: 1) patients with COPD grade I-IV, 2) patients with mild, moderate and severe anxiety 3) Can communicate well, 4) have never received the same intervention from researchers or other health professionals, 5) willing to be a respondent. 6) has no history of heart disease (angina pectoris / myocardial infarction and hypertension). 7) pulse frequency below < 100 times rest periods.

The step in determining the sample size is used the power analysis table using previous research conducted by Kang, et al (2009) to determine the number of samples in this study using the cohen formula where the power used is 0.80 and alpha 0.05. According to the power analysis table with alpha. 05, power .80 and effect sie 0.70, the number of samples used in this study was 32 people. The number of samples will be added by 10%. Then the number of samples used in this study were 35 people for the intervention class and 35 people for the control class. So that the total number of samples in this study were 70 people.

In the research preparation phase, etichal clearanceke health research ethics committee of the Faculty of Nursing, Universitas Sumatera Utara followed by taking care of the licensing of research sites. Then the respondent is asked in advance to fill in the characteristics data of the respondent consisting of age, sex, education, occupation, occupation, smoking history and duration of COPD. After explaining the research procedure and the respondent agreed to be involved in the study then the researcher examined or assessed the level of patient anxiety using the State Trait Anxiety Inventory (STAI) questionnaire developed by Charles D. Spielberger, after the pretest assessment Instruct the patient to walk for 6 minutes following the path that has been made, after walking 6 minutes the patient sat back in a chair, the patient was examined for vital signs and after resting for 5 minutes, then continued with breathing exercises pursed-lip breathing, by breathing deeply through the nose for 2 seconds until the chest and abdomen feel lifted up and then keep the mouth closed for inspiration and hold your breath for 2 seconds, then exhale through the lips that are pressed together and slightly open while contracting the abdominal muscles for 4 seconds, this procedure is done once a day for three consecutive days. At the posttest stage After three consecutive days of intervention, the researchers then re-evaluated by asking respondents to fill in the State Trait Anxiety Inventory (STAI) developed by Charles D. Spielberger (2010) The measurement results are documented in the observation sheet and data tabulation sheet.

III. Results and Discussion

3.1 Results

Characteristics of respondents in Pulmonary Poli at University of Sumatera Utara Hospital, the majority of respondents aged between 56-65 years as many as 11 people (31.4%), based on the sex of the majority of respondents were men as many as 31 people (88.6%), based on the work of the majority of respondents were entrepreneurs 18 people (51.4%), based on the level of education of the majority of high school graduates with a total of 19 people (54.3%), based on the smoking history of all respondents in the control group had a smoking history of 35 people (100%), the duration of stopping smoking the majority of 2 years and over was 20 people (57.1%) and based on the length of time they had COPD in the majority of 2 years and over with 25 people (71.4%).

Table 1 Frequency Distribution and Data Percentage Characteristics of Patients with Stable COPD Respondents in Pulmonary Poly at University of Sumatera Utara Hospital (N = 70)

No	Characteristics	Interventions		Control	
		N	%	N	%
1	Age				
	36 - 45 Years	4	11.4	5	14.3
	46 - 55 Years	10	28.6	5	14.3
	56 – 65 Years	10	28.6	11	31.4
	66 Years >	11	31.4	14	40
2	Sex				
	Male	31	88.6	27	77.1
	Female	4	11.4	8	22.9
3	Work				
	Civil Servants	5	14.3	1	2.9
	Army/Police	2	5.7	3	8.6
	Entrepreneurs	18	51.4	16	45.7
	Farmer	2	5.7	4	11.4
	Retired	6	17.1	6	17.1
	IRT, becak driver	2	5.7	5	14.3
4	Education				
	Elementary	3	8.6	1	2.9
	Middle School	11	31.4	6	17.1
	High School	12	34.3	19	54.3
	Further Education	9	25.7	9	25.7

5	Smoking History				
	Has Stopped	33	94.3	35	100
	Do Not Smoke	2	5.7	-	-
6	Duration of Stopping Smoking				
	Never Smoked	2	5.7	-	
	6 – 1 Years	15	42.9	13	37.1
	1 – 2 Years	4	11.4	2	5.7
	> 2 Years	14	40.0	20	57.1
7	Length of Time COPD				
	< 6 Months	-	-	1	2.9
	6 Months – 1 Years	-	-	2	5.7
	1 – 2 Years	18	51.4	7	20.0
	>2 Years	17	48.6	25	71.4

Based on the results of research conducted, the frequency distribution of anxiety levels in patients with stable COPD before and after the six minute walk test and pursed-lip breathing exercises in the intervention group, the majority of respondents had moderate anxiety levels of 34 respondents (97.1%). The results of more details can be seen in Tablel 2 below.

Table 2 Frequency Distribution of Anxiety Levels of Patients with Stable COPD in the Intervention Group (N = 34)

Score STAI	Anxiety Levels	Before		After	
		F	%	F	%
20 – 39	Light Anxiety	1	2.9	20	57.1
40 – 59	Medium Anxiety	34	97.1	15	42.9
60 – 80	Weight Anxiety	-	-	-	-

Based on the analysis of this study, the effect of before and after the six minute walk test and pursed-lip breathing intervention on anxiety caused by dyspnea in the intervention group was analyzed using the wilcoxon statistical test. The results of the analysis obtained the mean value before the action is carried out has a value of 1.97 ± 0.169, while after the intervention the mean value is 1.43 ± 0.502 with a p value of 0.000. Based on the results of the analysis that there is a difference between the anxiety level of patients with stable COPD before and after the six minute walk test intervention and pursed-lip breathing in the intervention group.

Table 3 Results of Analysis of the Effects of Before and After Six Minute Walk Tests and Pursed-Lip Breathing on Anxiety Caused by Dypsnea in Patients with Stable COPD in Intervention Group (N = 35)

Group		Mean ±SD	P Value
Intervention	Before	1.97±0.169	
	After	1.43±0.502	0.000

Analysis of Anxiety Caused by Dypsnea in Patients with Stable COPD in Control Group (N = 35)

Based on the results of research that has been done, the frequency distribution of anxiety levels in patients with stable COPD in the control group without any treatment, the majority of respondents have moderate anxiety levels of 34 respondents (97.1%). As for the results, more details can be seen in Table 4 below.

Table 4 Frequency Distribution of Anxiety Levels withStable COPD in Control Group (N = 35)

Score STAI	Anxiety Levels	Before		After	
		F	%	F	%
20 – 39	Light Anxiety	1	2.9	1	2.9
40 – 59	Medium Anxiety	22	62.9	23	65.7
60 – 80	Weight Anxiety	12	34.3	11	31.4
		35	100	35	
					100

The results of the analysis of the effect before and after the intervention six minute walk test and pursed-lip breathing on anxiety caused by dypsnea in the control group were analyzed using the wilcoxon statistical test to get the mean value before the action was carried out had a value of 2.31 ± 0.530, whereas after

the intervention the mean value was 2.29 ± 0.519 with p value of 0.763. Based on the results of the analysis that there is no difference between the anxiety level of patients with stable COPD in the control group.

Table 5 Results of Anxiety Level Analysis of Dyspnea in Patients with Stable COPD in Control Groups (N = 35)

Group		Mean ±SD	P value
Control	Before	2.31±0.530	
	After	2.29±0.519	0.763

Hypothesis of Effect Before and After Six Minute Walk Test and Pursed-Lip Breathing Exercise for Dyspnea Anxiety in Patients with Stable COPD in Intervention and Control Groups (N = 70)

Based on the Mann-Whitney U test, it was found that the mean rank of the control group 37.39 and the six minute walk test and pursed-lip breathing intervention group 23.03 with a p value of 0.000 where p value < 0.005 concludes that the six minute walk test and pursed-lip breathing significantly influence anxiety due to dyspnea in stable COPD patients. The difference in anxiety levels in patients with stable COPD to the control and intervention groups can be seen in Table 6 below:

Table 6 Results of Analysis of Effect Before and After Six Minute Walk Test and Pursed-Lip Breathing to Dyspnea Anxietyin Patients with Stable COPD for the Control Group and Intervention Group (N = 70)

Variable	Intervention		Control		Asymp. Sig (2-Tailed)
	MR	SR	MR	SR	
Anxiety				1308.50	
	23.03	806.00	37.39		0.000

The results of the above analysis can be concluded from the hypothesis of this study is the effect before and after the six minute walk test and pursed-lip breathing on anxiety due to dyspnea in patients with stable COPD for the intervention group, while the intervention interpretation can reduce the degree of anxiety due to dyspnea experienced by patients with stable COPD.

3.2 Discussion

Based on the analysis test found the mean rank of the control group 37.39 and the six minute walk test and pursed-lip breathing intervention group 23.03 with a p value of 0.000 where p value < 0.005 can be concluded that the six minute walk test and pursed-lip breathing significantly effect the anxiety due to dyspnea in patients with stable COPD.

The hypothesis in this study can be concluded accepted (Ha) because there is a significant difference in the intervention group with the six minute walk test and pursed-lip breathing with the control group without any treatment for anxiety due to dyspnea in stable COPD patients.

This is in line with research conducted by Kim., Kim, H and Lee (2014) differences in anxiety score changes regarding breathing difficulties during exercise between the intervention group, who did the six minute walk test and pursed-lip breathing exercises, and the control group, which did not doing the six minute walk exercise, from the analysis of the experimental group the score decreased from 2.89 to 2.69 while the control group increased from 2.92 to 3.15, which was statistically significant difference ($p < 0.05$).

Research conducted by Mohamed.S.A (2019) created an exercise program aimed at influencing dyspnea and anxiety in patients with chronic obstructive pulmonary disease to help improve breathing and control anxiety. The results of this study showed a statistically significant improvement after program intervention on dyspnea symptoms and anxiety status at post ($p < 0.05$) and there was also a positive relationship between anxiety and dyspnea after the intervention.

Six minute walk test and pursed-lip breathing exercises are considered as exercises that are easily implemented with minimum costs for respiratory rehabilitation, and are considered capable of reducing the training load on patients because it involves the same amount of exercise as daily activities, thereby motivating patients and increasing their self-confidence about practice. The six minute walk test exercise and pursed-lip breathing are expected to be used as nursing interventions for rehabilitation of breathing and anxiety of patients with stable COPD. In addition, more exercise programs must continue to be developed for respiratory rehabilitation.

The nursing theory used in this research is Kolcaba nursing theory where the role of nurses in providing patient comfort both physically, psychologically, spiritually and socially life where the comfort context can be seen through physical, psycho-spiritual, environmental and social values from the 3 ideas put forward by Kolcaba namely relief, ease, transcendence (Aligood, 2014). This is in line with the results of research that the six minute walk test and pursed-lip breathing can reduce anxiety levels due to dyspnea in stable

COPD patients so as to prevent complications from becoming exerbation and increase comfort in carrying out physical activities of patients.

3.3 Research Limitations

This study found several obstacles and limitations so this research was far from perfect. The limitations in this study are; 1) this study did not identify other factors that could effect anxiety in COPD patients. 2) this study did not control the use of patient drugs during intervention. 3). In this study subjective measurement of anxiety using a questionnaire did not assess anxiety based on objectives such as changes in vital signs of COPD patients (blood pressure, pulse, respiration and temperature).

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Yudi Akbar" The Effect of Six Minute Walk Test and Pursed-Lip Breathing on Anxiety Caused by Dypsnea in Patients with Stable Chronic Obstructive Pulmonary Disease (COPD) at University of Sumatera Utara Hospital" IOSR Journal of Nursing and Health Science (IOSR-JNHS), vol. 8, no.06 , 2019, pp. 67-72.