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Original Article

EFFECTIVENESS OF GUIDED IMAGERY TO %FEV$_1$, *ABSOLUT NEUTROPHIL*, ANXIETY, AND QUALITY OF LIFE IN STABLE CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENT

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Abstract

Background: *COPD is a leading factor in morbidity and mortality worldwide associated with excessive chronic inflammatory response. Guided imagery is a relaxation technique that aims to achieve the desired positive outcome. This study analyzed the effectiveness of guided imagery in stable COPD patients on the value of %VEP1, absolute neutrophils, anxiety, and the standard of living in those with steady COPD.*

Methods: *Experimental analytic research with quasi experimental, pretest and post test design. Subjects were outpatient stable COPD patients at the pulmonary polyclinic of UNS Surakarta Hospital in January-June 2022. Subjects were divided into guided imagery intervention groups for 4 weeks and controls. Subjects were then examined for %VEP$_1$ by spirometry, absolute neutrophils, TMAS anxiety questionnaire, and SGRQ quality of life questionnaire, and re-evaluated after four weeks.*

Results: *There were 32 research subjects. The findings demonstrated that the therapy group did not endure a significant increase in the mean value of %VEP$_1$ (p=0.617(p>0.05)). While the mean value of%VEP1 significantly decreased in the control group (p=0.025(p<0.05)), Given that the control group's value of %VEP1 fell while the treatment group's increased, even if the difference was not statistically significant, the use of guided imagery was able to effectively halt the decline in %VEP$_1$ value. Compared to the control group (p=0.014(p<0.05)), the TMAS anxiety score was lower in the treatment group (p=<0.001(p<0.05)). The overall SGRQ score (quality of life) considerably decreased in the treatment group (p=<0.001(p<0.05)) while significantly increasing in the control group (p=0.014(p<0.05)). Absolute neutrophils were found in both the treatment group and the control group (p=0.642 and (p=0.224(p>0.05)), respectively. Absolute neutrophil blood levels in the treatment and control groups did not differ significantly.*

Conclusion: *Guided imagery is effective on %VEP$_1$ values, anxiety, and quality of life in stable COPD patients but is not effective against absolute neutrophils.*

Keywords: *COPD guided imagery, %VEP$_1$, absolute neutrophils, anxiety, quality of life*

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a major global source of sickness and mortality (COPD). By 2030, COPD will be the third primary factor for mortality worldwide. This pulmonary disease causes more than three millions death or 6 percent (%) of the global number of deaths in 2012.[1,2] Chronic obstructive pulmonary disease (COPS) is generally progression and increased chronic inflammation when toxic gases or particles enter the airways or lung parenchyma. Systemic inflammation in COPD is associated with comorbid diseases for anxiety and depression, cardiovascular disease, osteoporosis, lung cancer, respiratory infections, metabolic diseases such as diabetes mellitus, gastroesophageal reflux disease (GERD), and bronchiectasis. Disorders of

anxiety and depression are prevalent co-occurring conditions with COPD.[3,4]

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2022 states that COPD management includes pulmonary rehabilitation, education, smoking cessation, drugs, oxygen therapy, mechanical ventilation, and nutrition. Definition of pulmonary rehabilitation according to the European Respiratory Society (ERS) and the American Thoracic Society (ATS) are proof, interdisciplinary, and all-encompassing treatments for individuals with symptoms of a chronic respiratory illness and frequently experience a decrease in activities of daily living. By normalizing or lowering systemic signs of the condition, the main objectives are to lessen symptoms, enhance functional status, boost involvement, and lower health care expenditures. Programs for pulmonary rehabilitation in addition to provide physical exercise, psychological and social support which is very important in facilitating To assist patients in reducing negative emotions and creating a socially positive community, the adjustment process can be aided by fostering responsive thought and behavior.[5–7]

Relaxation therapy has benefits both physiologically and psychologically, namely increasing oxygen saturation and reducing Depression and anxiety among Patients with COPD. Relaxation also has benefits on the body's immune system. The research of Sutanto et al., in Surakarta, Indonesia in 2021 stated the effectiveness of hypnotherapy on the immune system and improved responsiveness to normal treatment in asthma caused by psychogenic factors. Research by Sutanto et al., in Surakarta, Indonesia also stated the effectiveness of hypnotherapy in improving stress mediators and improving standard control of psychogenic asthma therapy. Trakhtenberg research in the United States in 2008 stated that guided imagery help boost the body's immune system and lessen tension.[8–10]

A method of relaxation called guided imagery tries to achieve a desired positive outcome, which uses one or more of the five senses and deliberately focuses attention to elicit a calming image of an unreal environment. The outcome of guided imagery can be designed to meet the needs of each patient such as relaxation, pain relief, healing, post-surgery, and comfort with doctor's care. The research at state and abroad that has been carried out regarding the effect of guided imagery in various clinical conditions on the forced expiratory volume in one second (% FEV1), oxygen saturation, shortness of breath, decreased absolute neutrophils and lymphocytes, pain, anxiety, quality of life, and depression.[11–16]

Research on the effectiveness of guided imagery in an effort help lessen symptoms and enhance the quality of life for those with COPD has not been widely studied both abroad and in Indonesia. The study of Wai and Louie in Hong Kong in 2004 stated that there was a significant increase in saturation in COPD patients who were given guided imagery relaxation. The research of Hariyono et al., in Surabaya in 2019 stated that there was an effect of peak expiratory flow, controlled visualization, and pursed lip breathing in COPD patients. The research will further analyze the effectiveness of guided imagery in stable COPD patients on %VEP1 values using spirometry, absolute neutrophils, anxiety using the Taylor Minnesota Anxiety Scale (TMAS), and use the St. George's Respiratory

Questionnaire (SGRQ) to obtain life (SGRQ) because it has never been done before in Indonesia.[17,18]

METHOD

This research employed an experimental analytical design with a quasi-experimental, pretest and post- test design. The research was done at the pulmonary polyclinic of Sebelas Maret University Hospital (UNS) Surakarta in Semester 1 (January – June 2022).

The target population in this study were patients with stable COPD GOLD groups B and C based on the GOLD 2022 criteria is the value of % FEV1/ FVC post bronchodilator < 0.70, in stable COPD group B GOLD classification criteria 1 and 2, exacerbations 0-1 times per year, mMRC score 2 and CAT score 10 while stable COPD group C has GOLD classification criteria 3 and 4, exacerbations > 2 times per year, mMRC score 0-1 and CAT score <10 and in stable condition. The affordable population was patients with stable COPD GOLD group B and C outpatients at the pulmonary polyclinic of UNS Surakarta Hospital in Semester 1 (January – June 2022) until the number of samples was met.

Sample selection is done by purposive sampling. Determination of the sample that received guided imagery or control was done by consecutive sampling. Samples with odd serial numbers are included in the treatment group and samples with even serial numbers are included in the control group.

The sample size was calculated based on the hypothesis testing formula for the mean of two independent populations, based on the value of the standard deviation of FEV1/FVC

i and Louie in 2004 in Hong Kong. Then the minimum number of samples required is 16 patients in each group.

The inclusion criteria of the study included GOLD stable COPD patients group B and C at the pulmonary polyclinic of UNS Hospital Surakarta, aged over 40 years, agree to provide written consent for participants in the research, ablee to understand and speak Indonesian, and able to do guided imagery according to instructions. While the exclusion criteria included acute exacerbation of COPD, patients with acute infectious diseases, malignancy, using steroid therapy, patients still smoking, chest wall deformity, physical and sensory disabilities, heart failure or acute coronary syndrome, pneumothorax, pleural effusion, and lung bullae, the patient is pas c a surgery in the thorax or abdomen, abnormalities in the abdomen (ascites and peritonitis), neuromusculoskeletal disorders (stroke, Parkinson's, and myasthenia gravis), experiencing severe cognitive or psychiatric disorders, acute bleeding and acute hemolytic transfusion reactions, congenital blood disorders, using drugs such as chemotherapy drugs, phenothiazines, and aminopyrine , suffer from autoimmune conditions such as systemic lupus erythematosus and spleen disorders.

Stable COPD patients with the inclusion criteria with odd numbers were included in the treatment group with guided imagery intervention for 4 weeks while subjects with even numbers were included in the control group without guided imagery intervention treatment. The patient was then asked to do a %FEV1 examination with spirometry, take 3 cc of venous blood for absolute neutrophil examination at the UNS Surakarta Hospital laboratory, fill out the anxiety scale assessment with the TMAS questionnaire, and assess the

quality of life scale with the SGRQ questionnaire, and re-evaluate after four weeks.

The data was examined using SPSS version 21 for Windows, the Statistical Package for the Social Sciences. Analysis of the effect of independent variables on the dependent variable in this study was to use statistical data analysis of pre and post- treatment differences in the group control and treatment. Data analysis %FEV1, neutrophil absolute, anxiety, and quality of life before and after treatment using paired t test if the data is distributed normally, or the Wilcoxon test if they are not. Data analysis to compare the treatment and control groups using the unpaired t test If the data distribution is normal, an unpaired t test will be used to compare the treatment and control groups; otherwise, a Mann-Whitney test will be used. The result is said to be meaningful if $p < 0.05$.

RESULT

This study was conducted on outpatients who have been diagnosed with stable COPD GOLD groups B and C based on the GOLD 2022 criteria at the pulmonary polyclinic of UNS Hospital Surakarta in semester 1 (January – June 2022). This study involved 32 patients divided into two groups, namely the treatment group (standard COPD therapy and guided imagery adjunct therapy) and the control group (COPD standard therapy). In 16 treatment subject's spirometry was performed to assess %FEV1, absolute neutrophil blood, TMAS score to assess anxiety, and SGRQ score to assess life quality in GOLD stable COPD patients in groups B and C (pretest) and 4 weeks after received treatment (post-test).

1. Characteristics of research subject

Table 1 lists the characteristics of the research participants.

Table 1. Characteristics of research subject

Characteristic	Group		p-value
	Treatment (n = 16)	Control (n = 16)	
Gender (%)			1,000[a]
Men	10 (62.5%)	10 (62.5%)	
Women	6 (37.5%)	6 (37.5%)	
Age (mean±SD)	57.94 ±6.95	62.13 ±7.82	0.120[b]
COPD group (%)			0.154[a]
B	9 (56.3%)	5 (31.3%)	
C	7 (43.8%)	11 (68.8%)	
%VEP$_1$ pre test (mean±SD)	59.90±28.62	50.02±20.64	0.273[b]
Neutrop absolut pre test (mean±SD)	4.94 ±1.31	5.07 ±1.81	0.880[c]
TMAS pre test score (mean±SD)	23.69 ±5.11	24.44 ±3.24	0.790[c]
SGRQ pre test score (mean±SD)	37.09 ±15.29	34.09 ±7.59	0.487[b]

The patients' average age was 57.94 ± 6.95 years in the treatment group and 62.13 ± 7.82 years in the control group. The statistical test produced a p value of = 0.120 ($p > 0.05$); there is no discernible difference between the treatment group and the control group in terms of the characteristics of the study participants based on age.

The majority of COPD patients were group B in the treatment group, as many as nine patients (56.3%) and the majority control group in group C with eleven patients (68.8%). The statistical tests resulted p value = 0.154 ($p > 0.05$) indicating no significant difference in the characteristics of the research subjects based on the COPD group between the treatment group and the control group.

The average of %FEV1 (pre test) is 59.90 ± 28.62 in the treatment group and 50.02 ± 20.64 in the control group with p = 0.273. The absolute neutrophil average (pre test) subject is

4.94 ± 1.31 in the treatment group and 5.07 ± 1.81 in the control group with p value = 0.880. The mean of TMAS score (pretest) namely 23.69 ± 5.11 in the treatment group while in the control group 24.44 ± 3.24 with p value = 0.790. The mean of SGRQ score (pretest) in the treatment group is 37.09 ± 15.29 while the control group is 34.09 ± 7.59 with p value = 0.487. The statistical test findings revealed a p value greater than > 0.05, implying no statistically significant difference in the essential features of the research participants between the treatment and control groups (homogeneous).

2. The results of the examination of %FEV1 in treatment and control groups.

The description and comparison of the %FEV1 between before (pretest) and after (posttest) therapy in the treatment and control groups and the comparison of the %FEV1 between the two groups is in table 2.

Table 2. Description and comparison of %FEV1 between before and after therapy in treatment and control groups

Group	%VEP1		p-value	Mean difference ±SD Median (min-max)
	Pre test Mean±SD	Post test Mean±SD		
Treatment	59.90 ±28.62	61.35±24.94	0.617[c]	1.45±11.39
Control	50.02 ±20.64	41.61 ±15.05	0.025[c]	-8.42 ±13.55
p-value	0.273[a]	0.0012[a]		0.005[b]

According to the report's results, it was discovered that the mean value of %FEV1 pre-test was 59.90 ± 28.62 in the treatment group and the average value of %FEV1 post-test was 61.35 ± 24.94. The mean difference in the change value of %FEV1 posttest-pre-test was found increased of 1.45 ± 11.39 or 2.4%.

The mean value of %FEV1 pre-test in the control group was 50.02 ± 20.64 and the mean value of %FEV1 post-test was 41.61 ± 15.05. The mean difference in the change value of %FEV1 posttest-pretest was found to decreased by -8.42 ± 1.55 or decreased by -16.8%. The description can be seen in table 2.

The difference in the value of the posttest - pretest (p = 0.005) received a p value of < 0.05 in the unpaired difference test, a significant difference in the change value of %FEV1.

3. The results of absolute neutrophil count of the treatment and control groups.

The mean difference in the absolute neutrophil posttest-pretest was found to have increased of 0.57 ± 1.85 or 11.2%. Description and comparison of neutrophil absolute between before (pretest) and after (posttest) guided imagery intervention in the treatment and control groups and the comparison of absolute neutrophils between the two groups is in table 3.

Table 3. Description and comparison of neutrophil absolute count between before and after therapy in treatment and control groups

Group	Neutrophil absolut ($x10^3$)		p-value	Mean Difference±SD Median (min-max)
	Pre test Mean±SD	Post test Mean±SD		
Treatment	4.94±1.31	4.65±1.42	0.642[c]	-0.29±1.34
Control	5.07±1.81	5.64±1.36	0.224[c]	0.57±1.85
p-value	0.880[b]	0.053[a]		0.143[a]

The paired difference test in the treatment group (p = 0.642) and control group (p = 0.224) get p value > 0.05, indicating the treatment group and the control group did not experience a significant change in absolute blood neutrophils, thus the administration of guided imagery treatment was not effective to reduce absolute neutrophils, it was proven in the unpaired difference test on the difference value of the posttest-pretest (p = 0.143) get p

value > 0.05, indicating no significant difference in the absolute neutrophils changes between the treatment group and the control group .

4. The results of TMAS score of the treatment and control groups.

The description and comparison of TMAS scores between before (pretest) and after (posttest) therapy in the treatment and control groups and the comparison of TMAS scores between the two groups is in table 4 .

Table 4. Description and comparison of TMAS score between before and after therapy in treatment and control groups

Group	TMAS Score		p-value	Mean Difference ±SD Median (min-max)
	Pre test Mean±SD	Post test Mean±SD		
Treatment	23.69 ±5.11	19.94 ±4.74	<0.001[c]	-3.75 ±2.44
Control	24.44 ±3.24	26.94 ±3.71	<0.001[b]	2.50 ±1.71
p-value	0.790[a]	<0.001[a]		<0.001[a]

The mean of pre-test TMAS score in the treatment group is 23.69 ± 5.11 and the post-test is 19.94 ± 4.74. The difference in TMAS score posttest-pretest decreased anxiety in average -3.75 ± 2.44 or decreased as big as -15.8%. The mean of TMAS pre-test score in the control group obtained of 24.44 ± 3.24 and the post-test mean of 26.94 ± 3.71. The change of TMAS score difference posttest-pretest was found increased in anxiety of 2.50 ± 1.71 or an increase of 10.2%.

Giving guided imagery treatment is effective and significant to reduce the TMAS score, it is proven in the unpaired difference test on the difference in the value of the posttest - pre test (p = < 0.001) got a p value < 0.05, showing a significant difference in the difference in changes in the TMAS score in the treatment group and the control group.

5. The results of the SQRQ score of the treatment and control groups.

The mean of pre-test SGRQ score in the treatment group was 37.09 ± 15.29 and the post-test SGRQ score was 26.92 ± 12.50. The difference in post test-pre test of total SGRQ score was found to decreased in average -10.17 ± 7.85 or decreased by -27.4%, which means there is an increase quality of life by 27.4%. The description and comparison of the total SGRQ scores between before (pre test) and after (post test) therapy in the treatment and control groups and the comparison of the total SGRQ scores between the two groups can be seen in table 5.

Table 5 . Description and comparison of SGRQ score between before and after therapy in treatment and control groups

Group	SGRQ total score		p-value	Mean Difference±SD Median (min-max)
	Pre test Mean±SD	Post test Mean±SD		
Treatment	37.09 ±15.29	26.92 ±12.50	<0.001[c]	-10.17±7.85
Control	34.09 ±7.59	37.22 ±7.48	0.014[c]	3.13 ±4.53
p-value	0.489[a]	0.009[a]		<0.001[b]

The paired difference test in the treatment group (p = < 0.001) got a p value < 0.05; the treatment group experienced a significant decrease in the total SGRQ score. The control group (p = 0.014) got a p value <0.05, describing that the control group experienced a significant increase in the total SGRQ score. Giving guided imagery treatment is effective and significant in reducing the total SGRQ score (improvement of quality of life), this is proven by unpaired difference test on the difference in the value of the posttest-pretest (p = < 0.001) got a p value < 0.05, describing a significant difference in the difference in changes in the SGRQ score between the guided imagery treatment group and the control group.

DISCUSSION

A decrease in FEV1 is a typical symptom of COPD. The decrease in FEV1 in COPD patients is due to inflammation and narrowing of the peripheral airways.[19] Neutrophil counts and their products are associated with airway obstruction, decreased of FEV1, reduced gas transfer, and development of emphysema. An increase in peripheral neutrophil count is a reflection of the systemic inflammation associated with disease severity and comorbidities in COPD.[20]

In COPD patients, anxiety and sadness are frequent and significant comorbidities. Anxiety and/or depression are connected in COPD patients to increased mortality, exacerbation rates, lengthier hospital admissions, worse wellbeing, and decreased functioning. [21] Using guided imagery, you can relax by picturing scenes and situations that make you feel good. The patient can achieve a relaxed state or experience thanks to the misconception. Patients with COPD or other chronic respiratory conditions might improve anxiety and shortness of breath by using guided imagery.[18,22]

1. Characteristics of research subjects

The subjects were patients with stable COPD groups B and C. This study involved 32 patients who had been diagnosed with GOLD stable COPD group B and C outpatients at the pulmonary polyclinic of UNS Surakarta Hospital in Semester 1 (January - June 2022) which were divided into two groups, 16 patients in the treatment group and 16 patients in the control group.

Most of the samples in this study were male as many as 10 patients (62.5%) both in the treatment group and in the control group. The findings of this investigation are in line with data based on RISKESDAS 2013 in Indonesia that the prevalence of COPD higher in men as much as 4.2% than women 3.3%.[23] Firdausi et al.'s research in Surabaya in 2019 stated that Age > 40 years, being a man, smoking, beginning smoking age 40 years, residing in an urban region, and being underweight are risk factors that affect the prevalence of COPD. Men are 1.26 times more likely to develop COPD than women because the majority of smokers are male. The higher prevalence of COPD in men reflects higher cigarette consumption among men in western countries during the early twentieth century. -20, but is gradually changing as the disease is more recognized and smoking habits have changed globally. The higher prevalence of COPD in men reflects higher cigarette consumption among men in western countries during early 20th century, but it is gradually changing as the disease is more recognized and smoking habits have changed globally.[24,25] The findings from the statistical tests yielded a value of p = 1.000 (p > 0.05), indicating that there is no discernible difference between the treatment group and the control group in terms of the characteristics of the study participants with regard to gender.

The mean age (years) of the subjects was 57.94 ± 6.95 in the treatment group while in the control group was 62.13 ± 7.82. The mean age of the research subjects based on Sutanto et al ., in Surakarta 2018 was found to be 65.12 ± 8.94 years and 67.18 ± 9.99 years in the control group. According to PDPI and GOLD, the prevalence rises with age, peaking at age >60.5,24.[5,24] COPD risk is increased with age since it is linked to aging owing to cumulative exposure over the course of a person's lifetime. The statistical test yielded p = 1.20 (p > 0.05), indicating no significant

difference between the treatment group and the control group in terms of the age-related features of the study participants.

The finding of the statistical test showed that the basic value of %FEV1, absolute neutrophils, TMAS scores, and SGRQ scores were p = 0.273, p = 0.880, p = 0.790, and p = 0.487 (p > 0.05) identifying no significant difference in the scores baseline %FEV1, absolute neutrophils, TMAS score, and SGRQ.

2. Effectiveness of guided imagery on %FEV1

The results of the study in the treatment group obtained (p = 0.617) p value > 0.05 indicating that the treatment group did not experience a significant increase in the mean value of %FEV1 , while the control group got (p = 0.025) p value <0.05 showing the control group experienced significant change in the mean %FEV1 value decreased.

Subjects who were given treatment experienced an increase in the value of %FEV1 compared to the control group which tended to decrease but the increase was not statistically significant, thus the administration of guided imagery treatment could significantly withstand the decrease in the value of %FEV1. This is proven in the unpaired difference test on the difference in the value of the difference before and after treatment to get a p value < 0.05 (p = 0.005), identifiying a significant difference in the difference in the change in the value of %FEV1 between the treatment group and the control group. Based on this description, the hypothesis which states "there is an effectiveness of guided imagery on the value of %FEV1 in stable COPD patients" is accepted.

Exposure to harmful particles such as tobacco smoke and harmful particles in COPD can trigger an inflammatory cascade in the small airways and lung parenchyma. Various kinds of inflammatory cells such as neutrophils, macrophages, lymphocytes and inflammatory mediators such as IL6, IL8, IL1β, TNF-, and TGF-β, coupled with pro-inflammatory cytokines that promote lung structural changes and airway remodeling. Decrease in value of %FEV1 COPD occurs due to inflammation, narrowing of the peripheral airways, and emphysema which can lead to dyspnea.[19,26–30]

Giving guided imagery is expected to decrease sympathetic nerve activity and activate parasympathetic nerves, through relaxation the patient will experience a relaxed condition so the respiratory rate decreases, the heart rate decreases, and the muscles become more relaxed. A decrease in respiratory rate can reduce %FEV1 so that it can reduce the symptoms of shortness of breath in COPD patients. This is in accordance with the research of Wai and Louie in Hong Kong in 2004 which stated that there was an increase in oxygen saturation in COPD patients who were given guided imagery.[18] Research by Fasolino et al., in the United States in 2019 also stated that massage, acupuncture, and guided imagery were effective in reducing symptoms in COPD patients.[31] Research by Hariyono et al., in Surabaya, in 2019 stated that the combination of pursed-lip breathing and guided imagery music was proven to boost the peak expiratory flow value in COPD patients.[17]

In this research, there was a significant difference in the difference in the change in the value of %VEP1 between the treatment group and the control group so that guided imagery could withstand the decrease in %VEP1 in stable COPD patients. There is the effectiveness of guided imagery on %VEP1 in

stable COPD patients, guided imagery is effective in preventing the decrease in %VEP1 in stable COPD patients.

3. Effectiveness of guided imagery on neutrophil absolute

Number of neutrophils increased in the airways associated with the severity of COPD. An increase in the number of peripheral neutrophils reflects systemic inflammation associated with disease severity and comorbidities in COPD. Even while fresh work in the field of psychoneuroimmunology is continually developing, the connection between the immune system and the brain is still not fully understood. Humans, and emotional stress affect the functioning of the immune system through endocrine mediation and central nervous system. One of the psychosocial variables that can affect immunosuppression or immunocompetence is the ability to cope. Research by Aini et al., in Riau 2017 stated that there was an increase neutrophil in COPD patients. The study of Lonergan et al., in the UK 2020 stated that an increased neutrophil count is a good indicator of the risk of exacerbation and mortality in COPD. Research by Oudijk et al., in the Netherlands 2004 stated that COPD is linked to neutrophil activation in the systemic compartment.[20,32–35]

The mean difference in absolute neutrophil change after and before treatment was found increase of 0.57 ± 1.85 or an increase of 11.2%. Paired difference test in the treatment group (p = 0 . 642) and control group (p = 0 . 224) obtained p nilai value > 0.05, which identifying the treatment group and the control group did not experience significant changes in absolute neutrophils, so that the guided imagery in treatment group was not effective in reducing absolute neutrophils.

In the unpaired difference test on the difference value before and after treatment the p value > 0.05 (p = 0.143), showing no significant difference in absolute neutrophil changes. Based on the explanation above, the hypothesis which states "There is an effectiveness of guided imagery on absolute blood neutrophils in stable COPD patients. Guided imagery can reduce absolute neutrophil blood in stable COPD patients" not accepted.

4. Effectiveness of guided imagery on TMAS score

Anxiety is more common in COPD patients than in the general population or in patients with other chronic diseases. Chronic obstructive pulmonary disease is connected to higher levels of psychological distress, and is connected with higher rates of exacerbations.[36,37] Anxiety disorders are often linked to chronic stress and inflammation. One of the main pathways of stress response is the HPA axis which is a reaction to stress. The hypothalamus releases CRH stimulating the anterior pituitary gland to secrete ACTH, as well as induces the release of cortisol from the adrenal glands. Chronic exposure to stress leads to overstimulation of the HPA axis and hypercortisolemia. Excessive cortisol secretion can lead to downregulation or compensatory resistance of glucocorticoid receptors that inhibit cortisol binding. Excess cortisol increases the affinity of the mineralocorticoid receptor and when bound to the mineralocorticoid receptor, cortisol has a proinflammatory effect.[38–40]

The binding of cortisol to glucocorticoid receptors can weaken the activity of the

sympathetic nervous system so that a decrease in glucocorticoid levels can lead to an increase in sympathetic nervous system activity. An objective anxiety scale assessment can use the TMAS instrument.[38–40]

Research by Vikjord et al., in Norway 2020 stated that individuals with COPD and anxiety disorders or depression can increase mortality.[37] The level of anxiety based on the results of the TMAS measurement is divided into three scales, namely the score < 20 mild anxiety, score 20-25 moderate anxiety, and score > 25 severe anxiety. In this study, the pre-test TMAS score in the treatment group was known to be 23.69 ± 5.11 which was a moderate level of anxiety and the TMAS score before treatment in the control group was obtained an average of 24.44 ± 3.24 which was a moderate level of anxiety. This is in line with Siddiqui et al., in Pakistan 2020 which stated a relatively higher frequency of anxiety in COPD patients.[41]

In this study, the difference in TMAS scores before and after treatment experienced a decrease in anxiety by an average of -3.75 ± 2.44 or decreased by -15.8%. The mean difference in the TMAS score before and after treatment was found to have an increase in anxiety of 2.50 ± 1.71 or an increase of 10.2%. The paired difference test in the treatment group got a p value of < 0.05 (p = < 0.001) showing the treatment group experienced a significant decrease in the TMAS score. The control group got a p value < 0.05 (p = < 0.001), showing the control group experienced a significant increase in the TMAS score.

Giving guided imagery treatment can effectively and significantly reduce the TMAS score, this is evidenced in the unpaired difference test on the difference in the value of before and after treatment getting a p value < 0.05 (p = < 0.001). There is a significant difference in the difference in TMAS score changes. This is in accordance with the research conducted by Apóstolo and Colcaba in Portugal 2019 which stated that guided imagery was effective in reducing depression, anxiety, and stress.[15] The research of Tavakolizadeh et al., in Mexico in 2018 stated that guided imagery was useful in reducing anxiety and psychology in patients with Acute Coronary Syndrome.[42] Research by Susilawati et al., in Tangerang in 2019 stated that guided imagery with music can reduce anxiety in patients who will undergo surgical procedures.[43] In this study, guided imagery was found to be effective in reducing anxiety in COPD patients.

5. Effectiveness of guided imagery on SGRQ score

COPD can reduce the patient's quality of life. In this study, the mean of total SGRQ pre-test score of the treatment group was 37.09 ± 15.29 and the SGRQ post-test score was 26.92 ± 12.50. This is in accordance with the research of Muthmainnah et al., in Riau 2015 which stated that the quality of life of COPD patients was not good.[44] The study of Cully et al., in the United States 2006 stated that both depression and anxiety were significantly associated with decreased life quality.[45]

The mean difference in the total SGRQ score after and before treatment decreased by an -10.17 ± 7.85 or decreased by -27.4% which means an increase in quality of life by 27.4%. The mean total pre-test SGRQ score in the control group obtained 34.09 ± 7.59 and the post-test 37.22 ± 7.48. The difference between changes in the total SGRQ score after and

before treatment was found to have an average increase of 3.13 ± 4.53 or an increase of 9.3%, which means that the quality of life decreased by 9.3%. The paired difference test in the treatment group (p = < 0.001) got a p value < 0.05. The treatment group experienced a significant decrease in the total SGRQ score. The control group (p = 0.014) got a p value <0.05, which means that the control group experienced a significant increase in the total SGRQ score.

Subjects who were given guided imagery experienced a decrease in the total SGRQ score compared to the control group which tended to increase. The provision of guided imagery treatment was effective and significant in reducing the total SGRQ score (improvement of quality of life), this was evidenced in the unpaired difference test on the difference in value after and before treatment (p = < 0.001) getting a p value < 0.05. There is a difference a significant difference in changes in the SGRQ score between the treatment group and the control group. Patients with stable COPD may see a satisfactory quality of life improvement thanks to guided imagery. This is in accordance with the research of Moody et al., in the United States 1993 which stated that guided imagery psychological intervention can significantly enhance the quality of life of patients with chronic bronchitis and emphysem.[46] Research by Zamzam et al., in Egypt 2012 stated that an increase in COPD severity was associated with an increase in the value of the SGRQ instrument.[47]

CONCLUSION

Guided imagery is effective on %FEV1 values, anxiety, and quality of life in stable COPD patients but is not effective on absolute neutrophils in stable COPD patients .

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