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: Chronic obstructive pulmonary disease (COPD) is a leading factor in morbidity and mortality worldwide associated with excessive chronic inflammatory response. Guided imagery is a relaxation technique to achieve the desired positive outcome. This study analyzed the effectiveness of guided imagery in stable COPD patients on the value of % FEV_1, 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 %FEV_1 by spirometry, absolute neutrophils, Taylor Minnesota Anxiety Scale (TMAS) questionnaire, and St. George Respiratory Questionnaire (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 %FEV_1 (P=0.617). Meanwhile, the mean value of %FEV_1 significantly decreased in the control group (P=0.025), given that the control group's value of % FEV_1 fell. In contrast, the treatment group's increased, even if the difference was not statistically significant, the use of guided imagery could effectively halt the decline in %FEV_1 value. Compared to the control group (P=0.014), the TMAS anxiety score was lower in the treatment group (P≤0.001). The overall SGRQ score (quality of life) considerably decreased in the treatment group (P≤0.001) while significantly increasing in the control group (P=0.014). Absolute neutrophils were found in both the treatment group and the control group (P=0.642; P=0.224, respectively). Absolute neutrophil blood levels in the treatment and control groups did not differ significantly.

Conclusion: Guided imagery is effective on %FEV_1 values, anxiety, and quality of life in stable COPD patients but not against absolute neutrophils.

Keywords: %FEV_1, absolute neutrophils, anxiety, COPD guided imagery, 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 caused more than three million deaths or 6 percent (%) of the global number of deaths in 2012.[1,2]

Chronic obstructive pulmonary disease (COPD) generally progresses and increases 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 rise in COPD patients with three or more comorbidities increases their likelihood of frequent hospitalizations and is associated with a higher mortality rate. Physical changes in the body can influence the patient's mental state, and vice versa. Patients with COPD are particularly susceptible to experiencing stress, depression, and anxiety symptoms.[5]

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. The definition of pulmonary rehabilitation according to the European Respiratory Society (ERS) and the American Thoracic Society (ATS) is 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.[6–8]

By normalizing or lowering systemic signs of the condition, the main objectives are to decrease symptoms, enhance functional status, boost involvement, and lower healthcare expenditures. Programs for pulmonary rehabilitation in addition to providing physical exercise, and psychological and social support which is very important in facilitating to assisting patients in reducing negative emotions and creating a socially positive community, the adjustment process can be aided by fostering responsive thought and behavior.[6–8]

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 for the body's immune system. The research of Sutanto et al, 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. Trakthtenberg's research in the United States in 2008 stated that guided imagery helps boost the body's immune system and lessen tension.[9–11]

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 (% FEV_1), oxygen saturation, shortness of breath, decreased absolute neutrophils and lymphocytes, pain, anxiety, quality of life, and depression.[12–17]

Research on the effectiveness of guided imagery to 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 by Wai and Louie in Hong Kong in 2004 stated a significant increase in saturation in COPD patients who were given guided imagery relaxation. The research of Hariyono et al in Surabaya in 2019 said that there was an effect of peak expiratory flow, controlled visualization, and pursed lip breathing in COPD patients.[18,19]

The research will further analyze the effectiveness of guided imagery in stable COPD patients on %FEV_1 values using spirometry, absolute neutrophils, anxiety using the Taylor Minnesota Anxiety Scale (TMAS), and the St. George's Respiratory Questionnaire (SGRQ) to obtain life (SGRQ) because it has never been done before in Indonesia.

METHOD

This research employed an experimental analytical design with a quasi-experimental, pre-test and post-test design. The research was conducted 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 % FEV_1/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, Modified Medical Research Council (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 FEV_1/FVC (%) from the research of Wai 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, agreeing to provide written consent for participants in the research, being able 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 %FEV_1 examination with spirometry, and around 3 cc of venous blood was drawn for absolute neutrophil examination at the UNS Surakarta Hospital laboratory. Patients then filled out the anxiety scale assessment with the TMAS questionnaire and assessed the quality-of-life scale with the SGRQ questionnaire. The patients were reevaluated after four weeks.

The data was analyzed 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 %FEV_1, 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 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 subjects' spirometry was performed to assess %FEV_1, 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 receiving treatment (post-test). Table 1 lists the characteristics of the research participants.

The patient's 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*=0.120; there is no statistically significant 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 in group B treatment group, with as many as nine patients (56.3%), and the majority control group in group C with eleven patients (68.8%). The statistical tests resulted in *P*=0.154 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 %FEV_1 (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*=0.880. The mean of the TMAS score (pre-test) namely 23.69±5.11 in the treatment group while in the control group 24.44±3.24 with *P*=0.790. The mean of the SGRQ score (pre-test) in the treatment group is 37.09±15.29 while the control group is 34.09±7.59 with *P*=0.487. The statistical test findings revealed a *P*>0.05, implying no statistically significant difference in the essential features of the research participants between the treatment and control groups (homogeneous).

The description and comparison of the %FEV_1 between pre-test and post-test therapy in the treatment and control groups and the comparison of the **%**FEV_1 between the two groups is in Table 2.

Table 1. Characteristics of the research subject

Characteristic	Group		*P*
	Treatment (n = 16)	Control (n = 16)	
Gender			
Men	10 (62.5%)	10 (62.5%)	1.000[a]
Women	6 (37.5%)	6 (37.5%)	
Age (mean±SD)	57.94±6.95	62.13±7.82	0.120[b]
COPD group			
B	9 (56.3%)	5 (31.3%)	0.154[a]
C	7 (43.8%)	11 (68.8%)	
%FEV_1 pre-test (mean±SD)	59.90±28.62	50.02±20.64	0.273[b]
Neutrophil 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]

Table 2. Description and comparison of %FEV_1 between before and after therapy in treatment and control groups

Group	%FEV_1		*P*	Mean±SD
	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	0.273[a]	0.0012[a]	----	0.005[b]

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

Group	Neutrophil absolute ($x10^3$)		*P*	Mean±SD
	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	0.880[b]	0.053[a]	---	0.143[a]

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

Group	TMAS Score		*P*	Mean±SD
	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	0.790[a]	<0.001 [a]	---	<0.001 [a]

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

Group	SGRQ total score		*P*	Mean±SD
	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	0.489[a]	0.009 [a]	---	<0.001[b]

According to the report's results, it was discovered that the mean value of %FEV_1 pre-test was 59.90±28.62 in the treatment group and the average value of %FEV_1 post-test was 61.35±24.94. The mean difference in the change value of %FEV_1 post-test and pre-test was found to increase by 1.45±11.39 or 2.4%.

The mean value of %FEV_1 pre-test in the control group was 50.02±20.64 and the mean value of %FEV_1 post-test was 41.61±15.05. The mean difference in the change value of %FEV_1 post-test and pre-test was found to decrease by -8.42±1.55 or decrease by -16.8%. The description can be seen in Table 2.

The difference in the value of the post-test and pre-test showed significant differences/changes of %FEV_1 (*P*=0.005). The mean difference in the absolute neutrophil post-test and pre-test was found to have increased by 0.57±1.85 or 11.2%. Description and comparison of neutrophil absolute between pre-test and post-test guided imagery intervention in the treatment and control groups and the comparison of absolute neutrophils between the two groups are in Table 3.

The paired difference test in the treatment group (*P*=0.642) and control group (*P*=0.224) 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 in reducing absolute neutrophils, it was proven in the unpaired difference test on the difference value of the post-test and pre-test (*P*=0.143) indicating no significant difference in the absolute neutrophils changes between the treatment group and the control group.

The description and comparison of TMAS scores between pre-test and post-test therapy in the treatment and control groups and the comparison of TMAS scores between the two groups is in Table 4.

The mean of the 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 post-test and pre-test decreased anxiety on average -3.75±2.44 or decreased as big as -15.8%. The mean of the TMAS pre-test score in the control group was 24.44±3.24 and the post-test mean of 26.94±3.71. The change of TMAS score difference post-test and pre-test was found to increase anxiety by 2.50±1.71 or an increase of 10.2%.

Giving guided imagery treatment is effective and significant in reducing the TMAS score, it is proven in the unpaired difference test on the difference in the value of the post-test pre-test (*P*≤0.001) showing a significant difference in the difference in changes in the TMAS score between the treatment group and the control group.

The mean of the 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 the post-test pre-test of total SGRQ score was found to decrease on average -10.17±7.85 or decreased by -27.4%, which means there is an increase in quality of life by 27.4%. The description and comparison of the total SGRQ scores between pre-test and 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.

The paired difference test in the treatment group got a *P*<0.001; the treatment group experienced a significant decrease in the total SGRQ score. The control group got a *P*=0.014, describing that the control group experienced a significant increase in the total SGRQ score. Giving guided imagery treatment is effective and important in reducing the total SGRQ score (improvement of quality of life), this is proven by an unpaired difference test on the difference in the value of the posttest-pretest (*P*≤0.001), 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 FEV_1 is a typical symptom of COPD. The decrease in FEV_1 in COPD patients is due to inflammation and narrowing of the peripheral airways.[20] Neutrophil counts and their products are associated with airway obstruction, decreased FEV_1, 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.[21]

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 well-being, and decreased functioning.[22]

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.[19,23] Guided imagery is a mind-body technique that uses mental visualization to improve well-being and encourage relaxation. It is founded on the idea that the mind and body are interconnected and can influence each other in both directions.[24]

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 is higher in men as much as 4.2% than in women 3.3%.[25] 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.[26,27]

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 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 the early 20^{th} century, but it is gradually changing as the disease is more recognized and smoking habits have changed globally.[26,27] The findings from the statistical tests yielded a *P*=1.000, indicating that there is no discernible difference between the treatment group and the control group in terms of the characteristics of the study participants concerning 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 the ISR and GOLD, the prevalence rises with age, peaking at age >60.5,24.[6,26] The risk of COPD is increased with age since it is linked to aging owing to cumulative exposure throughout a person's lifetime. The statistical test yielded *P*=1.20, 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 %FEV_1, absolute neutrophils, TMAS scores, and SGRQ scores were *P*= 0.273; *P*=0.880; *P*=0.790; and *P*=0.487 identifying no significant difference in the scores baseline %FEV_1, absolute neutrophils, TMAS score, and SGRQ.

The results of the study in the treatment group obtained (*P*=0.617) indicating that the treatment group did not experience a significant increase in the mean value of %FEV_1, while the control group had a *P*=0.025, showing the control group experienced a significant change in the mean %FEV_1 value decreased.

Subjects who were given treatment experienced an increase in the value of %FEV_1 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 %FEV_1. This is proven in the unpaired difference test on the difference in the value of the difference before and after treatment showed a significant difference in the change of %FEV_1 between the treatment group and the control group. Based on this description, the hypothesis that states "there is an effectiveness of guided imagery on the value of %FEV_1 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-α, and TGF-β, coupled with pro-inflammatory cytokines that promote lung structural changes and airway remodeling. A decrease in the value of %FEV_1 in COPD occurs due to inflammation, narrowing of the peripheral airways, and emphysema which can lead to dyspnea.[20,28–32]

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 %FEV_1 so that it can reduce the symptoms of shortness of breath in COPD patients. This is by 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.[19]

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.[33] 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.[18]

In this research, there was a significant difference in difference in the change in the value of %FEV_1 between the treatment group and the control group so that guided imagery could withstand the decrease in %FEV_1 in stable COPD patients. There is the effectiveness of guided imagery on %FEV_1 in stable COPD patients, guided imagery is effective in preventing the decrease in %FEV_1 in stable COPD patients.

The 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 the central nervous system.[21,34–37]

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 in neutrophil in COPD patients. The study by 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.[21,34–37]

The mean difference in absolute neutrophil change after and before treatment was found to increase by 0.57±1.85 or an increase of 11.2%. The paired difference test in the treatment group (P=0.642) and control group (P=0.224) showed no significant changes in absolute neutrophils, so the guided imagery in the treatment group was not effective in reducing absolute neutrophils. Guided imagery as a relaxation technique can help reduce stress and enhance the effectiveness of the immune system. Improvements or declines in immune system function are often linked to changes in white blood cell count or variations in neutrophil adherence.[24]

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

Anxiety is more common in COPD patients than in the general population or 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.[38,39] Anxiety disorders are often linked to chronic stress and inflammation. One of the main pathways of stress response is the hypothalamic-pituitary-adrenal (HPA) which is a stress reaction.[40–42]

The hypothalamus releases Corticotropin-releasing hormone (CRH) stimulating the anterior pituitary gland to secrete Adrenocorticotropic hormone (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.[40–42]

The binding of cortisol to glucocorticoid receptors can weaken the activity of the sympathetic nervous system so 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.[40–42]

Research by Vikjord et al, in Norway 2020 stated that individuals with COPD and anxiety disorders or depression can increase mortality.[39] The level of anxiety based on the results of the TMAS measurement is divided into three scales, namely the score of <20 mild anxiety, a score of 20–25 moderate anxiety, and a score of >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.[43]

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 (*P*≤0.001) showed the treatment group experienced a significant decrease in the TMAS score. The control group showed a significant increase in the TMAS score (*P*≤0.001).

Giving guided imagery treatment can effectively and significantly reduce the TMAS score, there is evidence of the difference in the value of before and after treatment (*P*≤0.001). This is following the research conducted by Apóstolo and Colcaba in Portugal in 2019 which stated that guided imagery was effective in reducing depression, anxiety, and stress.[16]

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.[44] 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.[45] In this study, guided imagery was found to be effective in reducing anxiety in COPD patients.

COPD can reduce the patient's quality of life. In this study, the mean of the 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 the research of Muthmainnah et al, in Riau 2015 which stated that the quality of life of COPD patients was not good.[46] The study by Cully et al, in the United States in 2006 stated that both depression and anxiety were significantly associated with decreased life quality.[47]

The mean difference in the total SGRQ score after and before treatment decreased by -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 was 34.09±7.59 and the post-test was 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 treatment group experienced a significant decrease in the total SGRQ score (*P*≤0.001). The control group experienced a significant increase in the total SGRQ score (*P*≤0.014).

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) as there was a statistically significant difference in SGRQ score after and before treatment (*P*≤0.001). Patients with stable COPD may see a satisfactory quality of life improvement thanks to guided imagery. This is to 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 emphysema.[48] Research by Zamzam et al, in Egypt in 2012 stated that an increase in COPD severity was associated with an increase in the value of the SGRQ instrument.[49]

LIMITATIONS

The satisfaction index for guided imagery in patients has not yet been evaluated. More research, including a satisfaction index assessment, is needed to determine the efficacy of guided imagery for patients with stable COPD. Direct evaluation of every patient undergoing guided imagery was not always possible for the researchers due to limited supervision availability, which may have influenced the study findings.

CONCLUSION

Guided imagery is effective on %FEV_1 values, anxiety, and quality of life in stable COPD patients but is not effective on absolute neutrophils in stable COPD patients.

REFERENCES

1. Hwang SL, Lin YC, Guo SE, Chi MC, Chou CT, Lin CM. Prevalence of chronic obstructive pulmonary disease in Southwestern Taiwan: A population-based study. Int J Respir Pulm Med. 2016;3(2):048.
2. Perhimpunan Dokter Paru Indonesia. Permasalahan di Indonesia. In: Penyakit paru obstruktif kronik (PPOK) diagnosis dan penatalaksanaan. 2nd ed. Jakarta: Perhimpunan Dokter Paru Indonesia; 2018. p. 3–6.
3. Perhimpunan Dokter Paru Indonesia. Penatalaksanaan. In: Penyakit paru obstruktif kronik (PPOK) diagnosis dan penatalaksanaan. 2nd ed. Jakarta: Perhimpunan Dokter Paru Indonesia; 2018. p. 39–73.
4. Mulhall P, Criner G. Non-pharmacological treatments for COPD. Respirology. 2016;21(5):791–809.
5. Wrzeciono A, Czech O, Buchta K, Zabłotni S, Gos E, Tłuczykont Ł, et al. Assessment of stress, depressive and anxiety symptoms in patients with copd during in-hospital pulmonary rehabilitation: An observational cohort study. Medicina (Lithuania). 2021;57(3):197.
6. Global initiative for chronic obstructive lung disease. Global strategy for prevention, diagnosis and management of chronic obstructive pulmonary disease. 2022.
7. Volpato E, Banfi P, Nicolini A, Pagnini F. A quick relaxation exercise for people with chronic obstructive pulmonary disease: Explorative randomized controlled trial. Multidiscip Respir Med. 2018;13(1):13.
8. Popa-Velea O, Purcarea VL. Psychological intervention - a critical element of rehabilitation in chronic pulmonary diseases. J Med Life. 2014;7(2):274–81.
9. Sutanto YS, Kalım H, Handono K, Sudiyanto A. Effect of hypnotherapy on immune response and standard therapy in psychogenic asthma patients. Turkish Journal of Immunology. 2021;9(1):28–35.
10. Sutanto YS, Sudiyanto A, Handono K, Kalim H. Modulation of stress mediator and asthma control level with hypnotherapy in psychogenic asthma patient. Int J Chemtech Res. 2016;9(11):235–43.
11. Trakhtenberg EC. The effects of guided imagery on the immune system: A critical review. International Journal of Neuroscience. 2008;118(6):839–55.
12. Coelho A, Parola V, Fernandes O, Querido A, Apóstolo J. Development of a guided imagery program for patients admitted to palliative care units. Revista de Enfermagem Referencia. 2018;4(17):23–32.
13. Cooney M, Quinlan-Colwell A. Distraction and relaxation. In: Assesment and multimodal management of pain 1st ed Missouri. 1st ed. Missouri: Elsevier Inc; 2020. p. 603.
14. Mardiani N, Hermawan B. Pengaruh teknik distraksi guidance imagery terhadap tingkatan ansietas pada pasien pra bedah di RSUD linggajati Kabupaten Kuningan. Jurnal Soshum Insentif. 2019;2:136–44.
15. Parizad N, Goli R, Faraji N, Mam-Qaderi M, Mirzaee R, Gharebaghi N, et al. Effect of guided imagery on anxiety, muscle pain, and vital signs in patients with COVID-19: A randomized controlled trial. Complement Ther Clin Pract. 2021;43:101335.
16. Apóstolo JLA, Kolcaba K. The effects of guided imagery on comfort, depression, anxiety, and stress of psychiatric inpatients with depressive

disorders. Arch Psychiatr Nurs. 2009;23(6):403–11.

17. Mahdizadeh MJ, Tirgari B, Abadi OSRR, Bahaadinbeigy K. Guided imagery: Reducing anxiety, depression, and selected side effects associated with chemotherapy. Clin J Oncol Nurs. 2019;23(5):E87–92.
18. Hariyono R, Soedarsono S, Makhfudli M. Effect of combination pursed lip breathing and guided imagery music on peak expiratory flow patients with chronic obstructive pulmonary disease. Jurnal Keperawatan. 2019;10(1):89–95.
19. Louie SWS. The effects of guided imagery relaxation in people with COPD. Occup Ther Int. 2004;11(3):145–59.
20. Perhimpunan Dokter Paru Indonesia. Patologi, patogenesis, dan patofisiologi. In: Penyakit paru obstruktif kronik (PPOK) diagnosis dan penatalaksanaan. 2nd ed. Jakarta: Perhimpunan Dokter Paru Indonesia; 2018. p. 15–24.
21. Lonergan M, Dicker AJ, Crichton ML, Keir HR, Van Dyke MK, Mullerova H, et al. Blood neutrophil counts are associated with exacerbation frequency and mortality in COPD. Respir Res. 2020;21(1):166.
22. Pumar MI, Gray CR, Walsh JR, Yang IA, Rolls TA, Ward DL. Anxiety and depression-Important psychological comorbidities of COPD. J Thorac Dis. 2014;6(11):1615–31.
23. Novarenta A. Guided imagery untuk mengurangi rasa nyeri saat menstruasi. J Am Chem Soc. 2013;1(2):179–90.
24. Krau SD. The multiple uses of guided imagery. Nursing Clinics of North America. 2020;55(4):467–74.
25. Soeroto AY, Suryadinata H. Penyakit paru obstruktif kronik. Indonesia Journal of Chest Critical Emergency Medicine. 2014;1(2):83–8.
26. Sutanto YS, Sagita DK, Suradi S, Kurniawan H. The effect of administration of lycopene on interleukin 8 levels and hospitalization time of patients with chronic obstructive pulmonary disease exacerbations. Jurnal Kedokteran Syiah Kuala. 2020;19(1):1–7.
27. Firdausi NL, Artanti KD, Li CY. Analysis of risk factors affecting the occurrence of chronic obstructive pulmonary disease in Indonesia. Jurnal Berkala Epidemiologi. 2021;9(1):18–25.
28. Yudhawati R, Prasetiyo YD. Imunopatogenesis Penyakit Paru Obstruktif Kronik. Jurnal Respirasi. 2019;4(1):19.
29. Hikichi M, Mizumura K, Maruoka S, Gon Y. Pathogenesis of chronic obstructive pulmonary disease (COPD) induced by cigarette smoke. J Thorac Dis. 2019;11(Suppl 17):S2129–40.
30. Sethi S, Mahler DA, Marcus P, Owen CA, Yawn B, Rennard S. Inflammation in COPD: Implications for management. American Journal of Medicine. 2012;125(12):1162–70.
31. Abboud RT, Vimalanathan S. Pathogenesis of COPD. Part I. The role of protease-antiprotease imbalance in emphysema. International Journal of Tuberculosis and Lung Disease. 2008;12(4):361–7.
32. Barnes PJ. Inflammatory mechanisms in patients with chronic obstructive pulmonary disease. J Allergy Clin Immunol. 2016;138(1):16–27.
33. Fasolino T. Reducing symptoms in chronic pulmonary patients with massage, acupuncture, and guided imagery. Iris Journal of Nursing & Care. 2019;1(5):1–6.
34. Rider MS, Achterberg J. Effect of music-assisted imagery on neutrophils and lymphocytes. Biofeedback Self Regul. 1989;14(3):247–57.
35. Hurul Aini QS, Adrianison A, Fridayenti F. Gambaran jumlah neutrofil darah tepi pasien penyakit paru obstruktif kronik (PPOK) di ruang rawat inap RSUD Arifin Achmad provinsi Riau tahun 2017. Jurnal Ilmu Kedokteran. 2019;13(2):134–40.
36. Oudijk EJD, Nijhuis EHJ, Zwank MD, Van De Graaf EA, Mager HJ, Coffer PJ, et al. Systemic inflammation in COPD visualised by gene profiling in peripheral blood neutrophils. Thorax. 2005;60(7):538–44.
37. Peavey BS, Lawlis GF, Goven A. Biofeedback-assisted relaxation: Effects on phagocytic

capacity. Biofeedback Self Regul. 1985;10(1):33–47.

38. Maurer J, Rebbapragada V, Borson S, Goldstein R, Kunik ME, Yohannes AM, et al. Anxiety and depression in COPD: Current understanding, unanswered questions, and research needs. Chest. 2008;134(4 Suppl):43S-56S.
39. Vikjord SAA, Brumpton BM, Mai XM, Vanfleteren L, Langhammer A. The association of anxiety and depression with mortality in a COPD cohort. The HUNT study, Norway. Respir Med. 2020;171:106089.
40. Vismara M, Girone N, Cirnigliaro G, Fasciana F, Vanzetto S, Ferrara L, et al. Peripheral biomarkers in DSM-5 anxiety disorders: An updated overview. Brain Sci. 2020;10(8):564.
41. Won E, Kim YK. Neuroinflammation-associated alterations of the brain as potential neural biomarkers in anxiety disorders. Int J Mol Sci. 2020;21(18):6546.
42. Taylor JA. A personality scale of manifest anxiety. J Abnorm Soc Psychol. 1953;48(2):285–90.
43. Siddiqui A, Iqbal S, Salman S, Iltaf S, Aurengzaib M, Ahmed I, et al. Anxiety and depression among chronic obstructive pulmonary disease. Romanian Journal of Neurology/ Revista Romana de Neurologie. 2021;20(4):448–51.
44. Tavakolizadeh J, Pahlavan M, Basirimoghadam M, Kianmehr M. Effects of guided imagery on anxiety and physiological indicators in in-patients with acute coronary syndrome. J Pharm Res Int. 2018;23(5):1–8.
45. Susilawati E, . M, Hendrawati MH, Resna RW. Guided imagery and music on anxiety of mayor operating inpatients of Tangerang General Hospital. KnE Life Sciences. 2019;2019:202–11.
46. Muthmainnah. Gambaran kualitas hidup pasien PPOK stabil di poli paru RSUD Arifin Achmad Provinsi Riau dengan menggunakan kuesioner SGRQ. Jurnal Online Mahasiswa Fakultas Kedokteran. 2015;2(2):1–20.
47. Cully JA, Graham DP, Stanley MA, Ferguson CJ, Sharafkhaneh A, Souchek J, et al. Quality of life in patients with chronic obstructive pulmonary disease and comorbid anxiety or depression. Psychosomatics. 2006;47(4):312–9.
48. Moody LE, Fraser M, Yarandi H. Effect of guided imagery in patients with chronic bronchitis and emphysema. Clin Nurs Res. 1993;2(4):478–86.
49. Zamzam MA, Azab N, El Wahsh RA, Ragab AZ, Allam EM. Quality of life in COPD patients. Respiration and Circulation. 2012;61(4):281–9.