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Article URL: <http://jurnal.fkmumi.ac.id/index.php/woh/article/view/woh7102>

The Effectiveness of a Combination of Swallowing Exercises with Benson Relaxation and Aromatherapy on the Swallowing Ability of Stroke Patients

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ABSTRACT

Stroke patients with dysphagia require proper initial screening so as not to cause severe complications. More optimal efforts are needed to improve swallowing ability to avoid complications. Swallowing exercises combined with Benson Relaxation and Aromatherapy are expected to provide better results in increasing the swallowing ability score of stroke patients with dysphagia. This study aims to determine the effect of the combination of Swallowing Exercise with Benson Relaxation and Aromatherapy on the swallowing ability of stroke patients. This type of research is a quasi-experimental pre and post-test. Researchers intervened in two groups of respondents. One group intervened with a combination of swallowing exercises with Benson relaxation, and one group combined swallowing exercises with aromatherapy. The sampling technique was consecutive sampling. The number of samples was 44 people: 20 people in Intervention Group I and 25 in Intervention Group II. Statistical analysis used a dependent t-test (paired t-test) to test the difference in the average score of swallowing ability before and after the intervention and an independent t-test to test the difference in the average score after the intervention in intervention groups I and II. This research showed a significant difference in the average score of swallowing ability before and after the intervention in the intervention group I and II, and there is no difference in the average score of swallowing ability after the intervention in the intervention group I and II. Swallowing exercise combined with Benson relaxation and aromatherapy can improve the swallowing ability score of dysphagia patients due to stroke.

Keywords : Dysphagia; Swallowing exercises; Benson relaxation; Aromatherapy

PUBLISHED BY :

Public Health Faculty
Universitas Muslim Indonesia

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Article history:

Received 30 Maret 2023

Received in revised form 30 Desember 2023

Accepted 16 April 2024

Available online 25 April 2024

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INTRODUCTION

Stroke is one of the leading causes of disability in adults. Stroke can cause limitations in motor skills, cognitive abilities, speech and language abilities, and changes in the ability to swallow¹. Report *World Stroke Organization* showed that stroke is a significant cause of lost workdays and poor quality of life².

Dysphagia is a condition where a person experiences difficulty swallowing liquids or food caused by problems with the swallowing process. Stroke patients with dysphagia have three times the risk of developing pneumonia compared to stroke patients without dysphagia³. In America, 6.2 million stroke patients experience obstacles to post-stroke recovery because of this problem. dysphagia not only increases morbidity and mortality after stroke but significantly affects the quality of life⁴. Dysphagia affects more than 50% of stroke patients in the recovery process. Most patients can improve their swallowing ability within seven days, but around 10% only experience improvement in their swallowing function in the 6th month.⁴.

Dysphagia in stroke patients occurs due to changes in the swallowing process's oral, esophageal, and oropharyngeal phases. This condition will cause aspiration of food, which will result in pneumonia¹. As many as 30% of stroke cases with dysphagia die due to this complication. Apart from that, another impact of dysphagia in stroke patients is malnutrition and dehydration, which, of course, will worsen the stroke patient's condition and increase the length of the patient's stay in the hospital.

Dysphagia screening needs to be done so that the risk of dysphagia can be detected early so that treatment can be carried out immediately. Swallowing ability screening is a safe and non-invasive procedure so that it can be done as before as possible⁵. Impaired ability to swallow or dysphagia in stroke patients requires intervention as early as possible to prevent various complications that patients can experience. Different practical methods can be used to avoid complications due to dysphagia, including adjusting posture when eating/drinking, changing the viscosity of food and drinks, oropharyngeal exercises, swallowing maneuvers, thermal stimulation, and enteral feeding⁶.

Fast screening and good treatment of patients with dysphagia will help patients avoid complications, speed up recovery, and improve the patient's quality of life. Independent nursing actions for patients with dysphagia found in Nursing Intervention and Classification are aspiration precaution, positioning, and swallowing therapy⁷. Several swallowing exercises show significant results, namely the Shaker method, Mendelson, Masako, Expiratory Muscle Strength Training (EMST), and Neuromuscular Electrical Stimulation (NMES)⁸.

In general, swallowing exercises performed on dysphagia patients provide good results for improving swallowing ability. Based on the results of research by Mc Cullough & Kim (2013), it was found that 18 stroke patients with Dysphagia were given swallowing exercises using the technique Mandelshon maneuver. All patients experienced an improvement in swallowing status after swallowing training for 1-2 weeks. Likewise, expiratory muscle training, one of the swallowing training techniques, is known to increase expiratory muscle strength, cough reflex strength, and the desire to cough. This

exercise positively affects stroke patients because it can improve cough reflex regulation, thereby increasing airway protection⁹.

Swallowing exercises, especially indirect swallowing exercises, can be done as early as possible. Indirect swallowing training includes adjusting the head position and body position when feeding, adjusting food consistency, modifying feeding, modifying the environment, and changing food consistency. This exercise aims to increase swallowing muscle strength without directly changing swallowing physiology.

Direct-method swallowing exercises require active participation from the patient. You were designed to change swallowing physiology. Consist of effortful swallowing, namely encouraging the patient to swallow with the full strength of the neck and pharyngeal muscles during swallowing and technique Mendelsohn that is, make a swallowing movement, place your hand on your neck, and feel the movement of your Adam's apple, then hold for a few seconds^{10, 11}.

Complementary therapy is widely used as an alternative therapy to be combined with swallowing exercises. Study¹² showed that standard swallowing exercises combined with acupuncture provided better results for the dysphagia condition of stroke patients. Several researchers also combined this combination of swallowing exercises with acupuncture, which all offered good changes in the patient's swallowing ability^{13, 14, 15}.

Various efforts made to improve the swallowing ability of stroke patients can experience obstacles if the patient is anxious. Benson relaxation can cause a decrease in physical and psychological stress, which, in concept, can reduce epinephrine, cortisol, and other stress hormones. Apart from that, relaxation conditions will provide excellent benefits for stroke patients because with relaxation conditions, blood pressure will be controlled, and the neurological problems they are experiencing will ultimately be improved. Many studies have shown the positive impact of Benson relaxation, both on anxiety, on reducing the pain response, and on improving the physiological status of stroke patients.^{16, 17, 18, 19, 20}.

Likewise with aromatherapy, providing aromatherapy is believed to have a relaxing effect on patients. Lavender aroma therapy is a therapy that uses essential oils that are considered to help reduce and even overcome psychological disorders and discomfort such as anxiety, stress, depression, and so on. According to scientific research, smelling aromas has an effect on the brain like alcohol; for example, lavender aromatherapy can increase the frequency of alpha waves in the back of the head, and this condition is associated with relaxation.²¹. This study aims to see the effect of a combination of swallowing training with Benson relaxation and aromatherapy on the swallowing ability of stroke patients.

METHOD

This type of research is quantitative with a quasi-experimental design pre and post test using two intervention groups. The number of participants in this study was 45, consisting of 20 people in intervention group I and 25 in intervention group II. Sampling was carried out by consecutive sampling,

with inclusion criteria: stroke patients with GCS > 12, experiencing swallowing disorders (dysphagia), receive medical therapy in the form of anti-hypertension drugs and neuroprotectors, be treated for at least seven days in the hospital, and available to be a respondent. The sample exclusion criteria were patients who experienced a decreased level of consciousness and who were forced to go home before being allowed to go home. Determination of the sample size is calculated by referring to the sampling formula with paired variables, with the standard deviation of the previous pairwise mean difference and the desired mean difference referring to the research results¹². The instruments used were the GUSS swallowing ability screening format and the format for implementing swallowing exercises, Benson relaxation and providing aromatherapy. Measuring results are expressed in scores.

The intervention carried out in intervention group I was a combination of swallowing exercises and Benson relaxation, and intervention group II was a combination of swallowing exercises and aromatherapy. Swallowing training is carried out three times a day, namely before the morning snack (09.00), one hour before lunch (11.00) and before the afternoon snack (13.00). Intervention group I did Benson relaxation exercises at night, and intervention group II did aromatherapy by dripping lavender aroma therapy on the pillow at least 2 hours before bed. The patient's swallowing ability is assessed again at the end of the exercise. The research was carried out by selecting respondents who met the criteria. Using the GUSS swallowing screening format, an initial score of swallowing ability is obtained. The intervention was carried out in intervention groups I and II. On the 7th day, the patient's swallowing ability was reassessed using the GUSS swallowing screening format, and a final swallowing ability score was obtained. Univariate Analysis done for the variables age, gender, type of stroke, comorbidities, frequency of attacks, ability to swallow before exercise, and ability to eat after exercise are presented in percentages and mean values. ABivariate Analysis used in this research is the dependent t-test (*paired t-test*) to test differences in swallowing ability scores before and after training. In contrast, an independent t-test was conducted to test differences in swallowing ability after training in intervention groups I and II. This research has received an Ethical Approval letter from the Tasikmalaya Ministry of Health Health Research Ethics Commission, number No. 2021/KEPK/PE/VI/00108.

RESULTS

Table 1 presents descriptive statistics on respondent characteristics, including age, gender, type of stroke, comorbidities, and frequency of attacks. The average age of respondents in intervention group I was 58.55; the youngest was 38, and the oldest was 86. The respondents' average swallowing ability score before the exercise was 8.60, and after the exercise, it was 15.70. In intervention group II, the average age of respondents was 57.52 years; the youngest was 38 years, and the oldest was 83 years. Most respondents in the Intervention I group were male, namely 12 people (60%). Most of the respondents experienced ischemic stroke, 13 people (65%). Based on comorbidities, 13 respondents (65%) had comorbidities, and all respondents were patients with a first stroke (100%). In the Intervention II group, the majority of respondents were women, namely 17 people (68%), and the

majority of respondents experienced ischemic stroke, 14 people (56%). Based on comorbidities, 16 respondents (64%) had comorbidities, and most of the respondents were patients who had experienced a stroke for the first time (80%).

Table 1. Respondent Characteristics

Variable	Group	
	Intervention I	Intervention II
Average age	58,55	57,52
Gender:		
Male	60%	32%
Female	40%	68%
Stroke Type:		
Ischemic	65%	56%
Hemorrhagic	35%	44%
Comorbidities:		
Existing	65%	64%
No one	35%	36%
Frequency of Attacks:		
First Time	100%	80%
Second or more	0%	20%

Table 2 shows the average swallowing ability score for Intervention Group I before the intervention, namely 8.60, while the average swallowing ability score after the intervention is 15.70. Meanwhile, in Intervention Group II, the average swallowing ability score before the intervention was 8.76, while the average swallowing ability score after the intervention was 17.24. The statistical test results obtained a *value of* 0.0001 in both groups; it can be concluded that there is a significant difference between the average score of swallowing ability before and after the intervention.

Table 2. Swallowing Ability Before and After Intervention

Group	Swallowing Ability Score	Mean	SD	SE	p Value	n
Intervention I	Before	8,60	4,20	0,602	0,0001	20
	After	15,70	4,00			
Intervention II	Before	8,76	4,34	0,781	0,0001	25
	After	17,24	4,76			

Table 3 shows that the average swallowing ability score after intervention in intervention group I was 15.70, while the swallowing ability score after intervention in intervention group II was 17.24. The statistical test results obtained a *p-value of* 0.254, meaning that at 5% alpha, there is no significant difference in the average swallowing ability score after intervention in the two groups of respondents.

Table 3. Differences in Swallowing Ability After Intervention Between Intervention Groups I & II

Variable	Group	Mean	SD	SE	p Value	n
Swallowing Ability	Intervention I	15,70	4,00	0,602	0,254	20
	Intervention II	17,24	4,76	0,781		25

DISCUSSION

A stroke can cause death of brain tissue, which can cause disability. Disability that occurs in stroke patients depends on the size of the lesion and the location of the lesion. A lesion in the brain that occurs due to a stroke will affect the Central Pattern Generator (CPG) located in the medulla oblongata and cranial nerves. This will interrupt the swallowing process, which is called dysphagia. Dysphagia occurs due to paralysis or weakness of the pharynx, larynx, and soft palate, thus causing disruption of the swallowing phase in the oro-pharyngeal phase. If the stroke lesion is in the left hemisphere, it will cause decreased oral motor activity and apraxia, while lesions in the right hemisphere are associated with delayed swallowing reflexes; the bolus is stuck in the pharynx, so it can result in aspiration²².

After a complete assessment of the stroke patient's cognitive, motor, and sensory skills, rehabilitation of swallowing ability needs to be carried out. Behavioral intervention can be done through swallowing exercises²². Swallowing exercises, especially indirect swallowing exercises, can be done as early as possible. Indirect swallowing training includes adjusting the head position and body position when feeding, adjusting food consistency, modifying feeding, modifying the environment, and changing food consistency. This exercise aims to increase swallowing muscle strength without directly changing swallowing physiology. Direct method consuming training aims to train motor muscles to strengthen motor muscles and improve neurological function. In addition, it provides a stimulus to the swallowing function receptors in the anterior pharyngeal arch, so it is hoped that normal swallowing physiology will return and increase the ability to swallow food boluses, train the strength of weak swallowing muscles, and increase the time to eat food boluses²³.

Direct-method swallowing exercises require active participation from the patient. You were designed to change swallowing physiology. Consist of *effortful swallowing*, namely encouraging the patient to swallow with the full strength of the neck and pharyngeal muscles during swallowing and technique that is, make a swallowing movement, place your hand on your neck, and feel the movement of your Adam's apple, then hold for a few seconds¹⁰. Swallowing exercises done early can improve stroke patients' ability to swallow better. Pneumonia, which is a complication of dysphagia, can be avoided, so swallowing exercises are essential for every stroke patient^{24, 25}. Slightly different from this research²⁶, it stated that swallowing exercises do not significantly prevent disability, pneumonia, and death, but swallowing exercises can shorten the patient's hospital stay.

To speed up the return of swallowing function in stroke patients, various additional efforts are made by combining swallowing exercises with complementary therapies. Multiple studies show

significant changes in swallowing exercises combined with various complementary therapies. Study¹² showed that standard swallowing exercises combined with acupuncture provided better results for the dysphagia condition of stroke patients. Several researchers also combined this combination of swallowing exercises with acupuncture, which all offered good changes in the patient's swallowing ability^{13, 14, 15}.

Efforts made to improve the swallowing ability of stroke patients can be made by increasing the patient's calmness so that the patient avoids feeling anxious. The anxious condition experienced by the patient can trigger an increase in blood pressure, worsening the patient's neurological condition. Therefore, stroke patients need to make various efforts to create relaxed conditions so that various neurological dysfunctions can be reduced, including dysphagia. One effort that can be made to develop a state of relaxation is with Benson Relaxation Exercises and aromatherapy.

Benson relaxation can cause a decrease in physical and psychological stress, which, in concept, can reduce epinephrine, cortisol, and other stress hormones. Apart from that, relaxation conditions will provide excellent benefits for stroke patients because with relaxation conditions, blood pressure will be controlled, and the neurological problems they are experiencing will ultimately be improved. Many studies have shown the positive impact of Benson relaxation, both on anxiety, on reducing the pain response, and on improving the physiological status of stroke patients.^{16, 17, 18, 19, 20}.

Benson's relaxation response may counteract the stress response in various patients with heart disease. However, no studies have investigated the impact of the Benson relaxation response on cerebrovascular patients. The effects of the Benson relaxation response may cause changes in physiological responses that occur in cardiovascular patients. Therefore, it is expected that the Benson relaxation response may influence the physiological response in cerebrovascular patients, resulting in changes in the physiological response in patients with acute ischemic stroke. Benson relaxation can cause a decrease in carbon dioxide levels in the blood, which is known to have a perfect effect on the physiology of the nervous system²⁷.

A decrease in carbon dioxide levels in the brain causes a reduction in ischemic areas so that brain tissue utilization becomes adequate. This will have a good impact on improving neurological function, sensory, motor, and visual, as well as the level of consciousness. Improving the physiological response in acute ischemia stroke patients after Benson relaxation exercises has a good effect on the outcome of stroke patients, namely, shortening the duration of ischemia and preventing repeated stroke attacks and more severe complications²⁷.

Another relaxation technique applied in this research is aroma therapy. Aroma therapy combined with swallowing exercises is expected to provide a better effect in improving the swallowing ability of stroke patients who experience dysphagia. Like Benson relaxation, Benson relaxation exercises combined with aromatherapy have an excellent impact on the patient's swallowing ability. The study results showed a difference in respondents' average swallowing ability score in intervention group II before and after the exercise.

It is believed that providing aromatherapy can have a relaxing effect on patients. Lavender aroma therapy is a therapy that uses essential oils that are considered to help reduce and even overcome psychological disorders and comfort disorders such as anxiety, stress, depression, and so on. According to scientific research, smelling aromas has an effect on the brain like alcohol; for example, lavender aromatherapy can increase the frequency of alpha waves in the back of the head, and this condition is associated with relaxation.²¹ The mechanism for relaxation when someone uses aromatherapy begins when the olfactory nerve conveys the aroma to the brain. The signals will stimulate the nervous system to release neurotransmitters such as serotonin and dopamine. This neurotransmitter is known to lower the stress threshold and provide relaxation. The effects of lavender aromatherapy, apart from those mentioned above, are known to produce many other effects such as soothing, anti-seizure and epilepsy, anti-pain, anti-addictive, antibacterial, and anti-fungal²⁸.

The state of relaxation obtained as an effect of aromatherapy has an excellent influence on the neurological status of stroke patients. Relaxation is known to be able to control blood pressure so that it can improve the neurological status of stroke patients. Research shows that aromatherapy can significantly reduce blood pressure significantly^{29, 30, 31}. Controlling blood pressure in stroke patients positively impacts motor, sensory, and other functional abilities. Research result³² state that psychological problems can play a role in the manifestation or worsening of dysphagia. Hence, it needs to be treated with appropriate planning to improve the patient's psychological condition.

The study's results showed no difference in the average swallowing ability in intervention group I, who carried out swallowing exercises with a combination of Benson relaxation, and intervention group II, who carried out swallowing exercises with a combination of aromatherapy. Although the two interventions did not show a significant statistical difference, swallowing exercises combined with aromatherapy experienced higher improvements than those connected with Benson relaxation.

Swallowing exercises combined with Benson relaxation and aroma therapy provide the same benefit in improving the swallowing ability of stroke patients who experience dysphagia. Both offer a relaxing effect that can enhance and maintain the neurological status of stroke patients.

A study compared the effectiveness of Benson relaxation and aromatherapy in reducing anxiety and pain in patients with burns. The research was conducted by conducting interventions on four groups of respondents, with different interventions: Benson relaxation, aromatherapy, a combination of Benson relaxation and aromatherapy, and a control group. The intervention was carried out for three consecutive days and once a day for 20 minutes, and each session lasted from 45 to 30 minutes. The results showed significant differences in pain anxiety among the four groups. This study concluded that both aroma therapy and Benson relaxation were very effective in reducing stress and pain experienced by respondents³³.

This study's results align with those conducted by researchers, where statistically, there was no significant difference in the average swallowing ability in the two intervention groups. This means that aromatherapy and Benson relaxation have an excellent effect on improving swallowing ability when

combined with swallowing exercises. Relaxation exercises have an essential role in reducing the negative impact of physiological and psychological problems that arise in many neurological conditions, such as stroke, cerebral palsy, Parkinson's disease, and spinal cord injuries. There are many relaxation techniques available, such as autogenic relaxation training (art), biofeedback relaxation, progressive relaxation training, and relaxation—hypnosis³⁴.

CONCLUSIONS AND RECOMMENDATIONS

Swallowing exercises combined with Benson relaxation and aromatherapy can improve the swallowing ability scores of patients with Dysphagia due to stroke. These two combinations of swallowing exercises have a good influence on the swallowing ability of stroke patients. Therefore, researchers recommend these two interventions to be applied to stroke patients who experience Dysphagia.

ACKNOWLEDGMENTS

The author would like to thank all respondents who have been involved in research activities and all nurses in the Neurology Room at Dr. RSUD. Soekardjo Tasikmalaya and RSUD Ciamis Regency, as well as all levels of the Poltekkes Kemenkes Tasikmalaya, have provided the opportunity and support for this research activity.

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