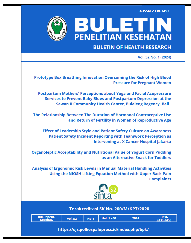

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Development of Melodic Intonation Therapy-Audio in Improving the Speaking Ability of Stroke Patients

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ABSTRACT

Introduction: This research aims to see the effect of modifying *Melodic Intonation Therapy* (MIT) and Dhikr Asmaul Husna in audio form on the speaking ability of stroke patients. Aphasia is a disability problem experienced by stroke patients and can become persistent, reducing their quality of life. Efforts are needed to improve speaking ability so patients can continuously and independently carry out post-stroke speech exercises at home. The results showed that MIT gave better results in improving the speech ability of stroke patients. In the MIT method, patients repeat words spoken by nurses or family members using musical elements while speaking.
Methods: This type of research is quantitative with a quasi-experimental design *pre* and *post-test*. Researchers carry out interventions using media in the form of *Melodic Intonation Therapy Audio* (MIT-A), which results from research development. This study's population is stroke patients treated at Dr. Soekardjo Tasikmalaya Hospital, Prasetya Bunda Hospital, and Banjar City Hospital. The sample consisted of 33 respondents from three Tasikmalaya and Banjar City hospitals. Exercises start when the patient is treated and continue to be done at home. Speech ability was evaluated using the TADIR method (Aphasia Test for Diagnostics and Rehabilitation), assessed before the intervention and at the first control visit. The intervention was carried out for one month. The hypothesis in this study is that there is a difference in the average score of speech ability before and after the intervention. The t-dependent test tests the difference in TADIR scores before and after training.
Results: The study showed a difference in the average TADIR score before and after training (p-value 0.000). This indicates that speech training using MIT-Audio has a significant effect on the speaking ability of stroke patients.
Conclusion: The results of this study conclude that speech training through modified MIT in audio form improves the speaking ability of stroke patients who experience aphasia. The researcher recommends that future researchers apply this speech training media by differentiating the type of aphasia experienced by the patient.

INTRODUCTION

Aphasia is one of the disabilities experienced by post-stroke patients. Aphasia is found in 20% to 40% of stroke patients. Aphasia can cause an increase in the length of stay for stroke patients, emotional instability such as depression, and have an impact on reducing the quality of life (Sanjaya, 2015). Two-fifths of patients with post-stroke aphasia can develop persistent aphasia after one year, which is called chronic aphasia, which requires therapy (Aghaz et al., 2018).

Melodic Intonation Therapy (MIT) can improve stroke patients' speaking ability (Haro-Martínez et al., 2019). In the MIT method, the patient repeats words spoken by the nurse or family using musical elements when speaking (rhythm and melody), (Schlaug, 2015). Although it has not been proven, most research shows that MIT produces good results. Compared with other types of therapy, MIT has advantages in the sound production phase and long-term effects because it uses melody in pronouncing sentences, so this provides better benefits because patients remember it more easily (Albert et al., 1973).

The results of Al-Shdifat's research, which compared the MIT technique using English and Arabic, showed that MIT carried out in Arabic intonation provided better development of speaking abilities (Al-Shdifat et al., 2018). The use of Arabic for patients who adhere to Islam will have a better impact because this language is often used when praying, doing dhikr, or reading the holy book Al-Quran. Of course, this has a more beneficial spiritual impact. Spirituality has a positive relationship to a person's physical and mental condition (Azar, N. S., Radfar, M., & Baghaei, 2020; Tariq, M., Ibrahim, M. T, Khan, A. A. & Kanwal, 2017; Naseri-Salahshour et al., 2018). The researcher developed MIT media as modified audio with dhikr therapy in this study.

MIT therapy modified with dhikr spiritual therapy can conceptually improve the patient's speaking ability. Dhikr can create a positive mood by changing negative emotions into positive emotions. Dhikr can activate endorphin hormones, which provide a feeling of happiness. Apart from that, dhikr therapy will also stimulate alpha waves, which increase body relaxation (Widarti, L., 2012). This is in line with the study of Newberg et al. (2015), which states that dhikr influences the stimulation activity of the autonomic nervous system so that it has an impact on the body's physiological response in the form of relaxation, which is characterized by stable rhythm and a decrease in pulse, respiration, and blood pressure (Newberg et al., 2015).

Melodic Intonation Therapy – Audio or called MIT-A is an audio media used for speech practice by applying the MIT (Melody Intonation Therapy) method combined with Dhikr Asmaul Husna to improve speech skills using musical elements (intonation and beats) as the main component, where one of the words spoken is the chanting of Dhikr Asmaul Husna and continued by listening to the audio of the chanting of Dhikr Asmaul Husna. MIT-A is used by stroke patients with speech disorders, aimed at improving speech skills through exercises that can be done independently by the patient following the instructions conveyed in the audio. MIT-A is equipped with the tune of dhikr asmaul husna at the end of the exercise.

MIT Development is considered practical and effective in improving the speaking ability of stroke patients. Patients were trained directly 6 times a week and then continued listening to MIT audio files using headphones. While listening to the audio, the patient continues to practice speaking skills or repeating sentences optimally. Patients can do exercises via audio at any time as often as possible. It is hoped that the intensity of training through this audio-listening method can further improve the speaking ability of stroke patients. This study aims to see the effect of the use of Melodic Intonation Therapeutic Audio (MIT-A) on the speech ability of stroke patients.

METHODS

This type of research is quantitative with a quasi-experimental design *pre* and *post-test*. This research carried out an intervention using media in the form of Melodic Intonation Therapy Audio (MIT-A), which resulted from research development. The intervention was conducted in three hospitals in the Tasikmalaya and Banjar City areas: Dr. Soekardjo, Tasikmalaya City, RSU Prasetya Bunda, Tasikmalaya City, and RSUD Banjar City. The sample in this study was stroke patients treated at the hospital who met the following criteria:

1. Inclusion Criteria:
    a. Pasien stroke GCS 15
    b. Having aphasia
    c. Be treated for at least 7 days
    d. Be prepared to be a respondent
2. Exclusion Criteria:
    a. Patients with complications

b. Hemodynamics unstable

The estimated sample size is calculated from the sampling formula with paired variables (Lemeshow, S., & Hosmer Jr, 1997):

$$n = \left\lceil \frac{\sigma\,(Z1-a + Z1-b)\,2}{(\mu 1 - \mu 2)} \right\rceil$$

Information :
σ: Standard deviation of the previous pairwise mean difference (16.1)
μ1- μ2 : Desired mean difference (minimum = 5)
Z1- α: Z value at 5% degree of significance = 1.96
Z1-β: Z value at 90% test power = 1.28

The sampling method was carried out by consecutive sampling technique. Based on the Lemeshow sample formula, the estimated sample size is 10.4 people, plus a 10% dropout reserve for 11 respondents for each hospital. The standard deviation of the previous pairwise mean difference and the desired mean difference refers to the research results (Conklyn et al., 2012). Based on the formula above, During the intervention activities from March 19 to August 28, 2024, a sample size of 33 people was obtained from Dr. Soekardjo Tasikmalaya, Banjar City Hospital, and Prasetya Bunda Hospital, Tasikmalaya City.

The instrument used is a speaking ability screening format using TADIR and MIT-A media for speaking practice. The Aphasia Test for Diagnostics and Rehabilitation (TADIR) assesses a patient's aphasia status. Developed in 1994 and published in 1996, TADIR diagnoses aphasia syndromes, identifies their types, supports counseling, and guides treatment. This test consists of questions with responses assessed based on accuracy, which provides a reference for diagnosing aphasia (Indonesian Association of Physical Medicine and Rehabilitation Specialists, 2000).

The intervention was in the form of speaking exercises using MIT-Audio media. While being treated in the hospital, patients accompanied by family and nurses are taught to do speaking exercises using MIT Audio. This modified MIT exercise begins with an opening stage in the form of instructions for positioning, praying, and deep breathing relaxation exercises. Some steps guide patients to train their speech muscles, including lip, tongue, and mouth muscle exercises followed by focal exercises A, I, U, E, and O. After that, guidance is given in the pronunciation of simple words and sentences and the pronunciation of Asmaul Husna. This modified MIT then ended with relaxation exercises through Asmaul Husna Dhikr therapy. Exercises are carried out daily while being treated in the hospital and continued at home accompanied by family. The total intervention time carried out was 1 month. Speech ability was measured using the TADIR scale before the intervention and at the next visit when the patient was in the clinic for control. Statistical analysis used univariate analysis, as well as bivariate analysis with a paired t-test to test the difference in the value of speech ability before and after exercise. This research was approved by Ethics Commission Board, Poltekkes Kemenkes Tasikmlaya No. DP.04.03/F. XXVI.20/134/2023.

RESULTS

The following are the results of the implementation of research activities at the three hospitals:

1. Univariate Analysis

The results of the univariate analysis of respondent characteristics in this study describe the distribution of respondents in terms of age, gender, type of stroke, comorbidities, frequency of attacks, ability to swallow before exercise, and ability to swallow after exercise.

Table 1. Distribution of Respondents Based on Age, TADIR Score Before and After Exercise (n=33)

Variables	Mean	SD	Min - Max	95% CI
Age	61.79	10.49	30 – 80	58.06 -65.51
Previous TADIR Score	7.88	6.47	0 – 21	5.58 – 10.17
TADIR Score After	12.30	6.63	0 - 28	9.95 – 14.65

Table 1 shows that the average age of respondents is 61.79 years old, the youngest is 30 years old, and the oldest is 80 years old. The average TADIR score before training was 7.88 and after training, 18.30.

Table 2. Distribution of Respondents Based on Gender, Type of Stroke, Frequency of Attacks, and Concomitant Diseases (n=33)

Variables	n	%
Gender		
Man	20	60.6
Woman	13	39.4
Types of Strokes		
Ischemic	26	78.8
Hemorrhagic	7	21.2
Concomitant Diseases		
Yes	30	90.9
None	3	9.1
Attack Frequency		
First	29	87.9
2nd/more	4	12.1

Based on Table 2 above, it can be seen that the majority of respondents were male: 20 people (60,6%). Most of the respondents experienced ischemic stroke: 26 people (78,8%). Based on comorbidities, 30 respondents (90,9%) had comorbidities, and 29 respondents (87,9%) were patients with a first stroke.

2. Bivariate Analysis

The dependent t-test was used to test the difference in TADIR scores before and after training. To see the effect of using MIT-A, researchers analyzed the data using t-test analysis by first carrying out a normality test. The normality test is carried out by comparing the skewness value with the standard error. The data is normally distributed if a value is obtained between -2 and +2. Normality tests were carried out for the TADIR Score variable before and after the intervention. The results of the normality test are described as follows:

Table 3. TADIR Score Normality Test

Variable	*SKEWNESS/SE*
TADIR Before	0.92
TADIR After	0.48

Table 3 above shows that the initial and final TADIR score variables are normally distributed, with values *SW/SE* 0.92 and 0.48, respectively. Because all data is normally distributed, the bivariate analysis used in this research is the dependent t-test.

The dependent t-test was used to test differences in initial and final TADIR scores. The following are the results of the dependent t-test analysis:

Table 4. Distribution of Average TADIR Scores Before and After Intervention

Speech Ability Score (TADIR)	Mean	SD	SE	p- *Value*	n
Before	6.99	6.47	0.73	0.000	33
After	10.67	6.63			

Table 3 above shows the average Initial TADIR score is 6.99, while the average Final TADIR score is 10.67. The statistical test results obtained a *value* of 0.000, so there is a significant difference between the initial and final TADIR average scores.

DISCUSSION

Melodic Intonation Therapy (MIT) is a therapy that is known to provide many benefits in improving communication skills in stroke patients. Research results (Haro-Martínez et al., 2019) found that MIT positively influenced the communication abilities of stroke patients with aphasia. MIT is a language therapy applied to aphasia patients after a stroke. Although it has not been proven, most research shows that training using the MIT method gives good results. In the MIT method, the patient repeats the words spoken by the nurse or family using musical elements when speaking (rhythm and melody) (Haro-Martínez et al., 2019; Schlaug, 2015).

The MIT exercise aims to improve language production by involving language areas in the undamaged right side of the brain. Aphasia patients are trained to maintain verbal rhythm by repeating what the therapist exemplifies by maintaining intonation. Compared to other types of therapy, MIT has advantages in the sound production phase and long-term effects because it uses melodies in pronouncing sentences. This provides better benefits because the patient remembers them more easily.

MIT's product development with modified speech exercises combined with the dhikr of Asmaul Husna in audio form can help aphasia patients carry out exercises independently after treatment in the hospital. The brain has an extraordinary ability to adapt, known as neuroplasticity. Neuroplasticity is the brain's ability to reorganize and form new neural connections in response to damage or change. This adaptability allows the brain to reorganize and form new neural connections in response to damage or change (Elizabeth et al., 2024). In stroke patients, damaged parts of the brain can be transferred to other healthy areas. Independent speech practice helps reactivate the neural pathways responsible for language, strengthens brain function, and improves speaking ability.

MIT-A is an audio medium that is used for speaking practice by applying the MIT method combined with the Dhikr Asmaul Husna to improve speaking ability which uses musical elements (intonation and beats) as the main component, where one of the words spoken is the chanting of the dhikr Asmaul Husna and continued by listening to the audio chanting of the dhikr of Asmaul Husna. MIT-A is used by stroke patients who experience speech disorders. It aims to improve speaking ability through exercises that the patient can do independently following the instructions in the audio. MIT-A is equipped with Asmaul Husna dhikr at the end of the exercise (Cahyati et al., 2024).

The use of MIT-A in patients with aphasia significantly affects the speech ability of stroke patients. The research results showed a change in the average TADIR score after the speech training intervention using MIT-A media. MIT-A is an innovative product that develops speaking practice media by combining MIT techniques and Asmaul Husna Dhikr.

This modified MIT begins with an opening stage in the form of instructions for positioning, praying, and deep breathing relaxation exercises. Some steps guide patients to train their speech muscles, including lip, tongue, and mouth muscle exercises followed by focal exercises A, I, U, E, and O. After that, guidance is given in the pronunciation of simple words and sentences and the pronunciation of Asmaul Husna. This modified MIT then ended with relaxation exercises through Asmaul Husna Dhikr therapy. If all of these steps are carried out routinely, they can optimize the speech training of post-stroke aphasia patients and ultimately improve the speech abilities of stroke patients (Cahyati et al., 2024).

It is believed that the deep breathing relaxation exercise found in the MIT modification can make the body calmer and more harmonious and can empower the body to overcome the disorders that attack it. The deep breathing relaxation technique benefits stroke patients greatly because it can control and reduce blood pressure significantly. Improved blood pressure has a significant influence in helping to restore cognitive and motor functions, including the ability to speak, in stroke patients. Many studies have proven that deep breathing relaxation has a significant effect on lowering patient blood pressure (Parinduri, 2020; Anggraini, 2020; Neini Ikbal & Permata Sari, 2019).

Deep breathing relaxation exercises can improve breathing control. The ability to speak is highly dependent on good breathing control. Stroke patients, especially those with dysarthria, may have difficulty controlling their breath while speaking. Deep breathing exercises help strengthen the respiratory muscles and improve airflow control so that the pronunciation of words becomes clearer and more regular. Breathing is the primary mechanism for maintaining subglottal pressure for voice production. When talking, there is a systematic outflow of air during exhalation. Spoken language production requires special adaptations of respiratory control, so deep breathing relaxation exercises effectively improve speaking abilities (Nallanthighal VS, Härmä A, 2020; Fuchs & Rochet-Capellan, 2021).

Apart from that, the deep breathing relaxation exercise carried out as an initial stage in the MIT-A modification exercise has a positive impact on helping to relax the speech muscles. Speech disorders in stroke patients are often caused by tension in the muscles of the face and mouth. By doing deep breathing relaxation exercises, patients can help release this tension so that the speech muscles become more relaxed and flexible. This allows the patient to speak more fluently and without excessive effort.

Speech organ muscle training is very important in improving the speaking ability of stroke patients. Disorders of the articulatory organs experienced by stroke patients will certainly not produce normal language (Novita & Kuntarto, 2020). Stroke patients experience difficulty in speaking; sentences are incomplete or incomplete, the words spoken are often backward, they are slow to speak or take a long time to pronounce sentences, and the words are often abbreviated (sometimes only the beginning of the word is mentioned and sometimes only at the end of a word). What causes stroke sufferers to have difficulty speaking is due to paralysis and weakness of the articulatory muscles. Stroke sufferers also experience damage to the motor cortex area, which controls the facial muscles, causing disruption of brain commands to some of the muscles (facial muscles, tongue, chin, and throat) needed for articulation (Novita & Kuntarto, 2020). On this basis, training the muscles of the speech organ is known to improve the ability to talk about stroke patients.

AIUEO therapy, which was added as an MIT modification to the audio used, has excellent benefits for improving the speaking ability of stroke patients. Therapy is a therapy that aims to improve speech so that other people can understand it by moving the tongue, lips, and facial muscles and pronouncing words (Syamima et al., 2022). The method used in AIUEO therapy is the imitation method, where the patient follows every movement of the speech organs and sounds produced by the nurse. Sound is produced due to vibrations, which are then received by the auditory nerve and received by the brain as information (Syamima et al., 2022). The application of communication therapy to aphasia patients using this method can help recovery from mild to moderate levels of aphasia. The results of research by Prihatin et al. (2017) show that Melodic Intonation Therapy (MIT) and AIUEO therapy affect speaking ability (Lia Wahyu Prihatin, Sri Puguh Kristiyawati, 2017). Several studies have proven that A, I.U, E, O exercises have a significant influence on improving the speaking ability of stroke patients (Afnijar Wahyu, Liza Wati, 2019; Astriani et al., 2019; Yulianto et al. 2021)

The researchers combined the three exercises mentioned above as basic steps before patients did MIT. MIT modification with dhikr spiritual therapy can improve stroke patients' speaking ability. MIT is the development of music as a therapeutic medium to improve language skills, using musical elements (intonation and beat) as the main component. MIT is effectively used for individuals who experience Broca's aphasia, where the individual experiences damage to the left hemisphere (Lia Wahyu Prihatin, Sri Puguh Kristiyawati, 2017).

MIT exercises involve phrases or sentences spoken with a certain melody and intonation. The word phrases and intonation taught are based on three elements, namely: 1) melody or variations in funds when pronouncing words or sentences, 2) tempo and rhythm of speech, and 3) emphasis on certain phrases (Baker, 2000). In its implementation, words are spoken rhythmically with a certain intonation, spoken twice a day; gradually, the nurse or therapist allows the patient to pronounce it themselves without help, and phrases that are trained with a certain melody gradually begin to be pronounced in daily communication (Baker, 2000).

Study results of Zulkurnaini et al. (2012) showed that reading dhikr and verses of the Quran can increase Delta waves in the brain, seen in Brodmann's area, where this area belongs to Broca's area responsible for processing the semantic aspects of language and verbal fluency. According to Knyazev (2011), Delta wave activation also produces human growth hormone (HGH) production through stimulation from the pituitary gland during Delta wave activation. In addition, Delta waves also stimulate the release of anti-aging hormones such as dehydroepiandrosterone (DHEA) and melatonin, so memorizing the Quran and dhikr improves communication in stroke patients with motor aphasia.

In this exercise, patients are guided to recite Asmaul Husna; apart from being a step to practice pronunciation, it is also an effort to increase devotion by always remembering Allah. This will impact calm and a feeling of sincerity, which ultimately has a relaxing effect and is very helpful in the recovery process of post-stroke patients. Practicing the pronunciation of Asmau Husna also has a good impact on the speaking ability of stroke patients; this is in line with research conducted by Sukarmin et al., (2021). Researchers carried out speaking exercises with the pronunciation of hijaiyah letters. The research results show that there is a significant difference in the verbal communication abilities of respondents before and after being given hijaiyah letter speech therapy (Sukarmin et al., 2021).

The results of research comparing dhikr and reading the Koran by pronouncing it and listening to it show that there is no difference. Both dhikr and reading the Koran can increase brain activity in the frontal, prefrontal, and temporal cortex lobes, so this has a very good effect on the patient's speaking ability (Fauzan, Norsiah, 2014).

Researchers developed the MIT-A media with modifications to the MIT exercises by adding basic exercises in the form of deep breathing relaxation exercises, speech organ muscle exercises, and AIUEO exercises. The next modification is adding Asmaul Husna dhikr therapy, which the respondent recites as part of word and sentence pronunciation training. The session ends with listening to the complete chant of Asmaul Husna dhikr. The modification that the author developed was then made in audio form so that it helps patients carry out independent exercises with guidance from the audio. It is hoped that this series of modifications will have a better impact on stroke patients who experience aphasia. The use of MIT-A in patients with aphasia has a significant effect on the speech ability of stroke patients. The results of the TADIR assessment showed an increase in speaking ability scores after the speech training intervention using MIT-A media.

Comparison with Previous Studies

This research is different from previous research. In this study, researchers modified MIT with dzikir asmaul husna therapy, a method known to provide a relaxing effect and train patients in reciting lafadz asmaul husna. Dhikr is known to create a positive mood by changing negative emotions into positive emotions. Dhikr can activate endorphin hormones, which provide a feeling of happiness. Apart from that, dhikr therapy will also stimulate alpha waves, which increase body relaxation (Widarti, L., 2012). This is in line with the study of Newberg et al. (2015), which states that dhikr influences the stimulation activity of the autonomic nervous system so that it has an impact on the body's physiological response in the form of relaxation, which is characterized by stable rhythm and a decrease in pulse, respiration, and blood pressure.

Implications for Public Health

This research has good implications for the speech development of stroke patients who experience aphasia. Post-stroke patients are provided with MIT Audio at home to carry out routine exercises independently to speed up their speaking ability.

Limitations and Cautions

Despite making significant contributions, our study has several limitations that must be acknowledged. This study only measured speaking ability using the TADIR method and did not differentiate between the types of aphasia experienced by patients. Different types of aphasia require different speech training approaches, so it is necessary to consider selecting samples with only certain types of aphasia to reduce bias in the research results.

Recommendations for Future Research

Based on the results of this research, it is necessary to see how this speech training media is applied by differentiating the type of aphasia experienced by the patient.

CONCLUSION

The results of this study concluded that speech training through modified MIT in audio form improved the speaking ability of stroke patients with aphasia.

Researchers recommend that nurses train patients to carry out speaking exercises since they are admitted to the hospital and continue to do this at home by carrying out evaluations every time the patient comes to visit for control at the hospital. Recommendations are also given to the family so that while at home, they can continue to accompany and monitor the patient's speech exercises.

Author's Contribution Statement: In this research, Yanti Cahyati, as the first author and main researcher, designs and conducts all research activities and compiles article manuscripts. In contrast, Ida Rosdiana, as a member researcher and 2nd author, contributes to providing training interventions using MIT-A, edits and finalizes the articles that have been prepared, and is tasked with improving the article manuscript.

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