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The effect of supportive religious audio on hemodynamic status

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Abstract
Stroke is a clinical condition where the blood supply to the brain is interrupted suddenly, and there is a disturbance of nerve function that causes a decrease in consciousness or even death with an unstable hemodynamic status. The treatment aims to improve the distribution of oxygen throughout the body as described by improvements in hemodynamic status. Complementary therapy of sensory stimulation in the form of supportive religious audio increases the production of endorphin hormone which relaxes the heart, thereby increasing hemodynamic stability. The purpose of this study was to determine the effect of supportive religious audio on changes in hemodynamic status in stroke patients with impaired consciousness. Quasi-Experimental with pre-test and post-test non-equivalent control group design was used in this research. The sampling method used was purposive sampling with the number of samples of each group was 24 respondents. Data analysis was done using the Mann-Whitney test, Independent t-test, and Mannova test. The supportive religious audio was given 2 times a day, each time 30 minutes for 2 days. Results showed that there was no significant effect in providing pleasant spiritual sound for changing the hemodynamic status of stroke patients with impaired consciousness ($p > 0.05$). The mean changes in systolic blood pressure and heart rate in the intervention group were more than the changes in the control group. It could be concluded that supportive religious audio can be one of the complementary therapies in stroke patients with an impaired consciousness to stabilize hemodynamic status with a more optimal administration.

Keywords: complementary therapy, hemodynamic status, impairment of consciousness stroke, supportive religious audio

1. Introduction
Stroke is a clinical condition where the blood supply to the brain is interrupted suddenly, and there is a disturbance of nerve function which may cause death [1-3]. The incidence of stroke patients in Indonesia in 2013 amounted to 12.1 per 1,000 population. The rate of stroke in Indonesia was based on the highest diagnosis of health workers in North Sulawesi (10.8 ‰), Yogyakarta (10.3 ‰), Bangka Belitung and DKI Jakarta (9.7 ‰) [4, 5].

Stroke can cause paralysis of the limbs, aphasia, difficulty in communicating, sexual disorders, impaired consciousness, and death [2, 6]. Impaired consciousness is a condition where the patient is not fully conscious so that he or she is unable to provide a reasonable response to the stimulus. It is also an emergency indicator that will lead to psychological and physiological changes in patients.

Patients who experience impaired consciousness will also experience a decrease in the working ability of the heart to provide an unstable hemodynamic status. This will affect intra-cranial pressure so that it will affect changes in perfusion and oxygen demand throughout the body, especially in the cerebral part. Treatment in patients with impaired consciousness has the aim to improve the distribution of oxygen throughout the body, where the diffusion of oxygen is strongly influenced by the good and bad of human hemodynamics.

Various medical and complementary nursing actions can accelerate the rehabilitation of the patients' condition with impaired consciousness. Complementary nursing therapy is needed because it does not have an adverse effect and can provide support both from the psychological and spiritual aspects [7]. Nursing actions are based on procedures, rules, and norms that apply; this is because nursing services are one of the professional services that are humanistic and based on nursing care and patient-oriented science [8].

One of the many complementary therapies developed to improve the health status of patients is the use of sensory stimulation. Sensory stimulation is an action aimed at the rehabilitation of patients. Visual stimulation can be in the form of vision, smell, taste, touch, and hearing [9]. The usage of sensory auditory is more common than other acoustic. Hearing sensory stimuli can be supportive of religious audio such as prayer, Quran recitation, music therapy, and playback of patients' family voice recordings. Previous research explained that sound treatment, especially music, had an effect on hemodynamic status in coma patients with stroke diagnosis [10, 11]. Based on this background, researchers conducted research that aimed to determine the impact of supportive religious audio on changes in hemodynamic status in stroke patients who experience impaired consciousness.

2. Materials and methods
Quasi-Experimental with pre-test and post-test non-equivalent control group design was used in this research. The sampling method used was purposive sampling with the number of samples of each group was 24 respondents. Data analysis was done using the Mann-Whitney test, Independent t-test, and Manova test. The supportive religious audio was given 2 times

a day, each time 30 minutes for 2 days. There were 6 variables of hemodynamic in this study, which were systole blood pressure, diastole blood pressure, mean arterial pressure, heart rate, respiratory frequency, and oxygen saturation.

3. Results & discussion

There were two hypotheses in this research. The first one was there were no significant differences between the intervention group and controls on hemodynamic status before treatment and the second was there were significant differences between the intervention group and control of the hemodynamic status after treatment. It was assumed that there was no difference in hemodynamic status scores between the intervention group and the control group before the treatment because the respondents came from the same population.

The results of an independent t-test of blood pressure and mean arterial pressure of respondents before treatment are shown in Table 1. Based on statistical analysis, all variables showed a p-value more significant than 0.05, so it can be concluded that there was no significant difference before treatment between the intervention group and the control group. On the other hand, the respiratory frequency variable obtained mean of 23.21 with a p-value of 0.007 as shown in Table 2 (p-value less than 0.05), so it can be concluded that there was a significant difference between the intervention group and the control group. This situation described that all respondents both in the control group and the intervention group were in the same condition before being given treatment.

Table 1: The Results of Independent T-Test of Blood Pressure and Mean Arterial Pressure of Respondents before the Treatment

Group		Variable		
		Systole	**Diastole**	**MAP**
Intervention	n	24	24	24
	Mean	156.04	89.17	111.25
	SD	30.757	16.918	20.399
	SE	6.277	3.453	4.164
Control	n	24	24	24
	Mean	146.46	86.38	106.83
	SD	25.305	10.858	14.977
	SE	5.165	2.216	3.057
p-value		0.356	0.500	0.397

Table 2: Mann-Whitney Test Results of Heart Rate, Respiratory Frequency, and Oxygen Saturation of Respondents Beforoe the Treatment

Group		Variable		
		Heart Rate	**Respiratory Frequency**	**Oxygen Saturation**
Intervention	n	24	24	24
	Mean rank	26.77	29.79	25.85
Control	n	24	24	24
	Mean rank	22.23	19.21	23.15
p-value		0.260	0.007	0.480

The stroke occurs when blood flow from the entire body to the brain is blocked, both with the presence of blockages caused by thrombus or embolus and rupture of blood vessels. With the presence of obstructions or rupture of blood vessels, brain tissue will experience a lack of oxygen [12]. Oxygen deprivation for a minute leads to recoverable symptoms such as impaired consciousness, but if a lack of oxygen occurs for a longer time, it may cause microscopic necrosis of neurons called infarcts [13]. This causes cardiovascular disorders which cause hemodynamic status including blood pressure, heart rate, mean arterial pressure, respiratory frequency and oxygen saturation.

Respondents in this study had an age ranging from over than 60 years old, which was included in the former category. At this age, the average blood pressure ranges from less than 150/90 mmHg, heart rate ranges from 80-100 times per minute, mean arterial pressure ranges from 60-160 mmHg, the respiratory frequency is less than 20 times per minute, and oxygen saturation is 95% - 100%. The description of hemodynamic status in the control group showed that the respondents experienced tachypnea with normal blood pressure, heart rate, mean arterial pressure, and oxygen saturation, whereas in the intervention group respondents experienced hypertension accompanied by tachypnea. The first hypothesis was accepted because there were no significant differences between the treatment group and the control group.

The results of an independent t-test of blood pressure and mean arterial pressure of respondents after the treatment are shown in Table 3, while Mann-Whitney test results of heart rate, respiratory frequency, and oxygen saturation of respondents after the treatment are shown in Table 4. The five dependent variables that are part of the hemodynamic status showed no differences between groups, whereas for the respiratory frequency in the intervention group and the control group showed a p-value of 0.008 which indicated there was a difference between groups.

Table 3: The Results of Independent T-Test of Blood Pressure and Mean Arterial Pressure of Respondents after the Treatment

Group		Variable		
		Systole	**Diastole**	**MAP**
Intervention	n	24	24	24
	Mean	137.71	82.08	99.54
	SD	17.568	9.771	11.773
	SE	3.586	1.994	2.403
Control	n	24	24	24
	Mean	145.83	85.00	105.08
	SD	25.305	11.034	12.789
	SE	4.034	2.252	2.611
p-value		0.139	0.337	0.125

Table 4: Mann-Whitney Test Results of Heart Rate, Respiratory Frequency, and Oxygen Saturation of Respondents after the Treatment

Group		Variable		
		Heart rate	**Respiratory Frequency**	**Oxygen Saturation**
Intervention	n	24	24	24
	Mean rank	21.06	19.33	26.13
Control	n	24	24	24
	Mean rank	27.94	29.67	22.88
p-value		0.87	0.008	0.381

This research was not in line with previous research. The results of previous studies showed there were differences in systolic blood pressure (p-value of 0.004) and diastolic blood pressure (p-value of 0.000), after being given treatment. The intervention in this previous study was in the form of music therapy and slow deep breathing for 20 minutes in 2 weeks [14]. The results of this study were different from previous studies because the mean difference in age of respondents in this study was 65 years or elderly. The older a person is, the more physiological changes that will occur so that the function of the human organs will decrease. Besides that, the duration and frequency of the treatment also influence the results of a study.

This study was in line with previous studies which showed that there were no differences in systolic blood pressure (p-value of 0.892), diastolic blood pressure (p-value of 0.667), and heart rate (p-value of 0.613) after treatment. The intervention in this study consisted of giving 30 minutes of music therapy in 2 days [15]. The results of other studies with music therapy for 20-40 minutes in a sample of patients undergoing Percutaneous Transluminal Coronary Angioplasty showed that there was no difference in systolic blood pressure (p-value = 0.726), diastole blood pressure (p-value = 0.884), heart rate (p-value = 0.868), oxygen saturation (p-value = 0.278) and respiratory frequency (p-value = 0.732) [16]. Thus, the second hypothesis was rejected because, among the 6 hemodynamic status variables, only one variable had a difference, namely the respiratory frequency which had a p-value <0.05.

Table 5 shows the results of statistical tests using Manova. The results of statistical analyses using Manova showed the effects of p-value 0.057, so it was concluded that supportive religious audio did not affect the hemodynamic status of stroke patients. The results of this study were following previous studies which stated that the Quran recitation therapy did not affect both systole and diastole blood pressure, respiratory frequency, and heart rate, but influenced the change in Glasgow Coma Scale (GCS) value.

Table 5: The Results of Manova Test

Independent Variable	Dependent Variable	Wilk' Lambda	Hypothesis df	Error df	Partial Eta Squared	p-value
Religious supportive audio	Systole	0.752	6.000	41.000	0.248	0.057
	Diastole					
	MAP					
	Heart Rate					
	Respiratory Frequency					
	Oxygen Saturation					

The results of this study were not in line with previous studies which said that there was a significant effect in lowering both systole and diastole blood pressure and heart rate in odontectomy patients in one hospital in Semarang City, Indonesia [17]. Other studies also stated that the use of music therapy could improve oxygen saturation, heart rate frequency, and respiratory frequency in neonates who used mechanical ventilation [18]. Besides, one study showed that there were significant differences between mean MAP, heart rate, and frequency of respiration before and after music therapy treatment for coma patients at one hospital in Lampung City, Indonesia.

Positive music or sound will give an impulse to the hypothalamus so that it will stimulate the adrenal medulla gland to suppress the hormones of epinephrine and norepinephrine, thus inhibiting the release of catecholamines into the blood vessels. As a result of the reduced concentration of catecholamines in the plasma, the heart rate decreases and oxygen consumption decreases which eventually becomes the frequency of slowing breathing [19].

Stimulus received by someone will affect the human nervous system. Music or Quran recitation is a sound stimulus. Initially, the incentive will be captured by the ear and then passed to the cerebral cortex to the limbic system. The stimulus is given to the hypothalamus through the hippocampus and amygdala. The hypothalamus will stimulate the anterior pituitary to secrete endorphins. Endorphin hormones will suppress the production of catecholamine's which will inhibit angiotensin formation so that there is a decrease in heart rate, blood pressure and oxygen consumption. Music or Quran recitation will also affect the parasympathetic nervous system to produce a relaxed condition [20].

Activities carried out by humans will be responded to by the brain, including when listening to voices because sound can affect brain activity. Brain activity can be seen through the Ectrleoenchepalogram (EEG) signal. EEG signals can be recorded through the cortex with an EEG device which will give a message to the hypothalamus which in turn reduces the secretion of neuropeptides and then continues to the autonomic nervous system body [11].

Supportive religious audio did not show a significant effect on hemodynamic status. However, the blood pressure of systole, diastole, MAP, heart rate, respiratory frequency, and oxygen saturation in the intervention group clinically decreased more than in the control group. This is proven by the mean different results for each dependent variable.

The hypothesis of this study was rejected because supportive religious audio did not give a significant effect on changes in hemodynamic status. It was predicted because supportive

religious audio administration in this study was conducted twice a day with a duration of 30 minutes, while the previous study duration of music therapy was 90 minutes. Further, the patients' condition was in conditions with GCS below 13. Conditions of such patients allow for instability of the hemodynamic status and stress factors of patients hospitalized. Besides, age factors also influence the results of the study because, with increasing age, it allows changes in the anatomy and function of the heart and blood vessels.

4. Conclusions

Based on this research, it could be concluded that there was no significant effect in giving supportive religious audio to change the hemodynamic status of stroke patients with impaired consciousness ($p > 0.05$).

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