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MUSIC AND AROMATHERAPY: A GOOD COMBINATION FOR REDUCING ANXIETY AND STABILIZING NON-INVASIVE HEMODYNAMIC STATUS IN PATIENTS IN THE INTENSIVE CARE UNIT

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Abstract
Background: Combining musical and aromatherapy therapy is expected to have a stronger effect in the reduction of anxiety and non-invasive hemodynamic stability.
Objective: To examine the effect of the combination of music and aromatherapy on anxiety and non-invasive hemodynamic in patients in the intensive care unit.
Methods: This was a quasy experimental study with non-equivalent group. An experimental group was given a combined musical and aromatherapy, while a control group was given music therapy. Thirty samples selected using accidental sampling, with 15 samples randomly assigned in the music group and combination group. HARS scale (Hamilton Anxiety Rating Scale) was used to measure anxiety. Non-invasive hemodynamic status of patients such as blood pressure and heart rate were documented in the observation sheet. Paired t-test and one-way ANOVA were used for data analysis.
Results: There were significant effects of combination therapy on anxiety (p=0.001), diastole (p=0.004) and heart rate (p=0.031), but no significant effect on systole (p=0.387). While music therapy alone had a significant effect on anxiety (p=0.001), systole (p=0.047), and diastole (p=0.037).
Conclusion: The combination therapy (music-aromatherapy) had a greater effect than the music therapy alone in decreasing anxiety, and stabilizing diastolic blood pressure and heart rate. This therapy can be used as an alternative in nursing interventions, and can be used as inputs to develop standard of operational procedure for anxiety and non-invasive hemodynamic stability.

Keywords: aromatherapy, noninvasive hemodynamics, anxiety, music therapy

INTRODUCTION

Intensive care is given to patients with stable critical conditions that require care, treatment, and strict observation (MOH, 2010). Living in the intensive care unit can create stressors for patients and families, which can be physical, environmental and psychological stressors. Factors that contribute to stressful events in patients in the intensive care unit include previous experience, pain, anxiety, unfamiliar environment, sleep quality disorders and fear (Jevon & Ewens, 2009). Patients who are critically ill and undergoing intensive care in

the unit require treatment and interventions that last 24 hours a day. Factors such as therapeutic interventions, diagnostic procedures, medications, basic processes of disease and noise levels in intensive care unit due to use of tools with alarms has an adverse effect on the physiology of the human body. High levels of noise can stimulate cardiovascular; increase gastric secretion, blood pressure, and adrenaline; and can cause heart failure. In the United States about 20 % of post-treatment patients in the intensive care unit experience Post Traumatic Stress Disorder with symptoms of sleep disorders and nightmares (Duke, 2006).

Psychological pressure from intensive care can cause anxiety because patients are simultaneously exposed to life threats, medical procedures, inability to communicate and loss of personal control that can lead to delirium. Such psychophysiological responses can activate the hypothalamus, pituitary, adrenal and sympathetic nervous systems characterized by a patient's hemodynamic changes in the form of increased heart rate, blood pressure, and cardiac output. Anxiety response can increase the workload on the cardiovascular system that is likely to be life threatening (Jevon & Ewens, 2009). Increased anxiety can lead to hemodynamic changes in the cardiovascular system, and can activate the sympathetic nerves thereby increasing the production of norepinephrine, which causes increased peripheral resistance (Aaronson & Ward, 2008).

This condition can lead to an increase in blood pressure. To overcome the problems experienced by patients during intensive care in the unit, pharmacological and non-pharmacological therapy can be done. The most useful and most effective pharmacological therapy is the provision of sedation drugs and analgesic for patients to feel comfortable and calm. Medical practitioners often recommend pharmacological treatments such as Morphine Sulphate, Fentanyl and Hydromorphone that have both sedation and analgesia effects. But the use of this pharmacological therapy, if used continuously, may lead to dependence (So'emah & Khotimah, 2015).

While non-pharmacological therapy used to overcome problems experienced by patients in the intensive care unit can be done by means of deep breathing relaxation, progressive muscle relaxation, self-absorption exercise, music therapy and aromatherapy. Non-pharmacological therapy is an alternative that can be given to reduce anxiety, sleep quality and patient's hemodynamic stability and other psychological problems. Non-pharmacological therapy is expected able to be make someone free from the pressure and anxiety, and affect hemodynamic status of patients (Trappe, 2012).

The existence of alternative therapy such as music therapy can help patients overcome depression and other disorders problems as well as help the healing process. Founder of Indonesian Institute of Music Power (IMDI) Prof. Tjuk Nyak Deviana Daudsjah, D.A.Mus.Ed explained that music therapy can help the healing of patients suffering from various diseases (So'emah & Khotimah, 2015). The results show that harp music has two beneficial effects for patients treated in the intensive care unit, which can relieve stress and the level of pain, stabilize blood pressure and overcome sleep disorders. Anne Baldwin's research states that patients who have low blood pressure, after listening to harp music, have stable blood pressure to normal range (Trappe, 2012).

Music therapy has the power to treat illness and improve one's mind ability. Music therapy can enhance, restore, and maintain physical, mental, emotional, social and spiritual health (So'emah & Khotimah, 2015). Music therapy is an attempt to improve the physical and mental quality with sound stimuli consisting of melody, rhythm, harmony, timbre, shapes and styles organized in such a way as to create music that is beneficial to physical and mental health. The effects of music therapy can widen and flex the blood vessels to facilitate the circulation of blood throughout the body (So'emah &

Khotimah, 2015). Suhartini's research results suggest that music therapy is effective in reducing the physiological response to the anxiety of patients treated at HCU-ICCU (Suhartini, 2010).

On the other hand, aromatherapy is also a non-pharmacological therapy that uses the method of treatment through the smell-odor medium derived from certain plant material. Aromatherapy can play a role in relaxing the mind and reducing stress, it is certainly associated with a more orderly emotional state (Wilkinson et al., 2007). The state of human emotion is governed by the brain within the limbic system. The limbic system is different from the limbic lobe. The limbic lobe is a structural unity consisting of archicorte x (hippocampalis and gentle dentatus formations), paleocortex (piriformis cortex of anterior hypochampalis gland), mesocortex (gyrus cinguli). Meanwhile, the limbic system is a combined limbic lobes and subcortical nuclei, ie amygdala, septales nuclei, hypothalamus, epithalamus, thalamus nucleus, and basal ganglia. The limbic system not only regulates the emotions, but also regulates the memory, and the behavior. Everything can be related to each other (Anatomy, 2008). Research on the effects of lavender aromatherapy on vital signs states that the results of blood pressure significantly improved in the treatment groups compared with the control group. It proves that lavender aromatherapy is effective for influencing vital signs (Lytle, Mwatha, & Davis, 2014).

Combining musical and aromatherapy therapy is expected to have a stronger effect in the reduction of anxiety and non-invasive hemodynamic changes. The mechanism through smell and hearing may have a faster response on anxiety and hemodynamic changes, and both of which have direct contact with the part of the brain in charge of stimulating the formation of effects induced by music therapy and aromatherapy. The received message is then converted into action in the form of release of electrochemical compounds that cause euphoric, relaxed, or sedative that affect the decrease in anxiety and changes in blood pressure, heart rate and MAP. Thus, the aim of this study was to examine the effect of the combination of music and aromatherapy on anxiety and non-invasive hemodynamic in patients in the intensive care unit.

METHODS

Study design

This was a quasy experimental study with non-equivalent group. An experimental group was given a combined musical and aromatherapy, while a control group was given music therapy.

Setting

This study was conducted in the intensive care units (ICU, HCU, and Intermediate unit) in the general hospital of Siti Khodijah Sepanjang Sidoarjo from January 2017 until February 2017.

Population and sample

The target population in this study was all patients who were treated in the intensive care units (ICU, HCU, and Intermediate unit) in the general hospital of Siti Khodijah Sepanjang Sidoarjo. The population in the last 6 months (July 2016- December 2016) was a total of 288 patients, the average patient per month amounted to 16 patients. There were 30 samples selected using accidental sampling, with 15 samples randomly assigned in the music group and combination group.

The inclusion criteria of the sample were patients, who did not use sedation drugs or other medicines, composmentis, have been given treatment during 1x24 hours. The exclusion criteria were patients using respiratory or ventilator aids, unconscious, patients receiving sedative medications, having a history of impaired sense of smell and hearing loss.

Intervention

The experiment group was given a combination of music therapy and aromatherapy. Music therapy was performed

for 30 minutes in a day. The patient listened to music using the headphone in the MP3 with low volume. The title of the music was Sound From Heaven, which can be heard before bedtime, or as the patient wishes, no matter if the patient fell asleep when listening to the music. While aromatherapy was given with 3 drops of 10 ml water for 30 minutes using essense oil of ylang ylang, aromatherapy diffuser tool placed on the table near the patient so that can be inhaled easily by patient. Both actions were performed in accordance with the existing procedures in the same way given together between music therapy and aromatherapy. Respondents listened to music while giving aromatherapy. The music group only was only given the music of Sound From Heaven using the headphone in the MP3 with low volume, similar with the combination group.

Instruments

HARS scale (Hamilton Anxiety Rating Scale) was used to measure anxiety (Hamilton, 1960). Each observed item was given 5 levels of scores between 0 and 4, the degree of anxiety measurements by summing the scores. The number of possible scores is <14, 14-20, 21-27, 28- 41, 42- 56. In this study, data retrieval of anxiety using HARS scale was performed by the nurses (research assistants) and the researcher. While non-invasive hemodynamic status of patients such as blood pressure and heart rate were documented in the observation sheet.

Ethical consideration

This study has been approved the Research Ethics Committee of Poltekkes Kemenkes Semarang with approval number: 073 / KEPK / Poltekkes-smg / EC / 2017. Prior to data collection, respondents were given informed consent, providing information about the purpose, benefits and research procedures.

Data analysis

Data were analyzed using univariate analysis (frequency distribution of blood pressure, heart rate, anxiety) and bivariate analysis using paired t-test and one-way ANOVA to see the effect of both groups and examine differences in anxiety and non-invasive hemodynamic changes.

RESULTS

Based on Table 1 the average of the distribution of anxiety and non-invasive hemodynamic before and after intervention of music therapy and combination therapy (aromatherapy-music therapy) showed that mean values of anxiety and systolic blood pressure decreased, while diastolic blood pressure tended to increase, and heart rate there was an increase and decrease after getting the intervention.

Table 1 Distribution of anxiety and non-invasive hemodynamic changes before and after given music therapy and combination therapy (music-aromatherapy) (n=30)

Variable	Intervention			
	Music therapy		Combination therapy	
	Pre (Mean ± SD)	Post (Mean ± SD)	Pre (Mean ± SD)	Post (Mean ± SD)
Anxiety	34.80±4.25	23.13±3.9	34.20±6.01	19.13±4.72
Systole	133.20±19.62	125.60±9.51	127.53±18.12	124.53±9.01
Diastole	73.20±8.8	78.80±4.84	72.53±9.20	79.73±5.97
Heart Rate	81.00±13.48	79.93±7.28	82.33±11.62	88.13±7.29

Table 2 Normality test using Kolmogorov Smirnov

Variable	Intervention			
	Music Therapy		**Combination Therapy**	
	z	***p***	**z**	***p***
Systole *(pre)*	0.683	0.739*	0.387	0.998*
Systole *(post)*	0.646	0.798*	0.720	0.678*
Diastole *(pre)*	0.598	0.867*	0.592	0.874*
Diastole *(post)*	10.024	0.245*	0.980	0.292*
Heart rate *(pre)*	0.760	0.610*	0.601	0.863*
Heart rate *(post)*	0.949	0.329*	0.923	0.362*
Anxiety *(pre)*	0.676	0.751*	0.843	0.476*
Anxiety *(post)*	0.560	0.912*	0.553	0.920*

**One sample K-S (p> 0.05)*

Table 2 shows that all variables in the music therapy and combination therapy had p-value >0.05, which indicated that all data were in normal distribution. While Table 3 shows that all variables had p-value >0.05, which indicated that all variances in all variables in both music group and combination group were homogeneous.

Table 3 Homogeneity using Levene's test

Variable	Intervention	*p**
Anxiety	Music therapy Combination therapy	0.126*
Systole	Music therapy Combination therapy	0.335*
Diastole	Music therapy Combination therapy	0.464*
Heart rate	Music therapy Combination therapy	0.232*

Table 4 Effect of music therapy alone on anxiety and non-invasive hemodynamic using paired t-test

Variable	Mean		*t*	*P**
	Pre	**Post**		
Anxiety	34.80	23.13	11.798	0.001*
Systole	133.20	125.60	2.183	0.047*
Diastole	73.20	78.80	-0.309	0.037*
Heart Rate	81.00	79.93	0.310	0.761

*Significant p <0.05

Table 4 shows that music therapy has significant effects on anxiety (p=0.001), systole (p=0.047), and diastole (p=0.037). There was a significant decrease on the mean of anxiety, systole, and diastole after given intervention. However, there was no significant effect of music therapy on heart rate (p=0.761) although there was a slightly decrease of the mean after intervention. Table 5 shows that there were significant effects of combination therapy on anxiety (p=0.001), diastole (p=0.004) and heart rate (p=0.031), but no significant effect on systole (p=0.387).

Table 5 Effect of combination therapy on anxiety and non-invasive hemodynamic using paired t-test

Variable	Mean		*t*	*P**
	Pre	Post		
Anxiety	34.20	19.13	11.655	0.001*
Systole	127.53	124.53	0.893	0.387
Diastole	72.53	79.73	-3.458	0.004*
Heart Rate	82.33	88.13	-2.400	0.031*

Table 6 Analysis of difference in anxiety and non-invasive hemodynamic after given music therapy alone and combination therapy using *One Way ANOVA*

Variable	Intervention	Mean	*F*	*p**
Anxiety	Music Therapy	23	4.457	0.018*
	Combination Therapy	19		
Systole	Music Therapy	126	0.358	0.701
	Combination Therapy	125		
Diastole	Music Therapy	79	3.462	0.041*
	Combination Therapy	80		
Heart rate	Music Therapy	80	5.904	0.006*
	Combination Therapy	88		

Table 6 shows that there were significant differences in anxiety (p=0.018), diastole (p=0.041), and heart rate (p=0.006) between music therapy group and combination group. There was no difference in systole (p=0.701) between both groups.

Table 7 Post Hoc mean difference using Tukey HBD

Variable	Intervention (I)	Intervention (J)	Mean Difference	*P*
Anxiety	Music therapy	Combination therapy	4.000	0.020*
	Combination therapy	Music therapy	-4.000	0.020*
Systole	Music therapy	Combination therapy	1.067	0.959
	Combination therapy	Music therapy	-1.067	0.959
Diastole	Music therapy	Combination therapy	-0.933	0.900
	Combination therapy	Music therapy	0.933	0.900
Heart Rate	Music therapy	Combination therapy	-8.200	0.006*
	Combination therapy	Music therapy	8.200	0.006*

Table 7 shows that there was significant difference in anxiety in the music group and combination group (p=0.020). However, based on HARS score the combination therapy had a higher effect in reducing anxiety (HARS score 19) compared with music therapy alone. While the music therapy alone had a better effect on stabilizing blood pressure than combination therapy with the average of blood pressure of 126/79 mmHg. There was also significant difference in heart rate in both groups (p=0.06) with the average of heart rate of 88 per minute.

DISCUSSION

Effect of Music therapy alone on anxiety and non-invasive hemodynamics

Findings of this study showed that there was a significant effect of music therapy alone on anxiety. This is in line with other studies showing that music therapy is effective to reduce physiological changes in anxiety (Suhartini, 2010). Previous research has also shown that music therapy is effective in reducing anxiety in patients treated in the HCU-ICCU (Wijanarko, 2006). Previous

research suggests that soft music will have a calming effect and reduce stress and anxiety with extraordinary results (Ganong, 1999). In addition, music therapy for 7 consecutive days influenced blood pressure changes in elderly patients with hypertension (Nafilasari, 2013).

When the music is heard and received by the ear, it will be forwarded to the limbic cortex, the hearing path proceeds to the hypocarpus, and forward the musical signal to the amygdala which is the area of conscious behavior that works on the subconscious level, the signal is then applied to the hypothalamus. The hypothalamus is the area of partially regulating the vegetative function and endocrine function of the body, as do many aspects of emotional behavior, the auditory path is passed to the reticular formation as the impulse distributor to the autonomous fiber. Nerve fibers have two systems of sympathetic nerves and sympathetic nerves. Both of these nerves can affect the contraction and relaxation of organs. Relaxation can stimulate the center of the sense of reward so that the emergence of tranquility and eliminate anxiety (Ganong, 1999).

The music stimulus also sends a message to the hypothalamus that further reduces the secretion of neuropeptide and then proceeds to the autonomic nervous system, the decrease of neuropeptide secretion causes the parasympathetic nervous system to effect a relaxed condition. This condition also causes decrease of catecholamine release by the adrenal medulla resulting in stability of pulse frequency, pressure blood, blood vessel obstruction and oxygen consumption by the body (Chiu & Kumar, 2003).

This study also revealed that there was a significant effect of music therapy alone on blood pressure. This is in line with the study stated that music therapy influences blood pressure of patients, including in pre-hemodialysis patients. Someone who listens to the appropriate music then his pulse and blood pressure can decrease steadily, brain waves slow down, and muscle muscles become relaxed (Sarayar, Mulyadi, & Palandeng, 2013).

Music can reduce stress. Patients treated with music will appear more relaxed and calm. Relaxation effects obtained through music therapy will affect the stability and decrease in blood pressure, pulse and breathing (Kemper & Danhauer, 2005). However, the results of this study revealed that music therapy alone had no effect on heart rate, which is in contrast with previous study said that music can stimulate the central nervous system to produce endorphins, which can lower blood pressure and heart rate and create a pleasant atmosphere so as to minimize fear and anxiety.

Effect of combination therapy (music-aromatherapy therapy) on anxiety and non-invasive hemodynamics

Findings of this study revealed that there was a significant effect of combination therapy (music-aromatherapy) on anxiety, diastolic blood pressure and heart rate. There was no effect on systolic blood pressure. This study specifically provides the new knowledge of this combination had a greater effect than the music therapy alone on anxiety and non-invasive hemodynamics.

The sense of smell and hearing in music and aromatherapy affect the limbic system and hypothalamus on brain, limbic system functions can change mood, memory and memory emotions, make more relaxation, and sleepy, while the hypothalamus that has hormones and neurochemical release can affect the vital sign and other organs (Ganong, 1999). Mechanism through smell and hearing is much faster because both have direct contact with parts of the brain in charge of stimulating the formation of effects caused by music therapy and aromatherapy. Received messages are then converted into actions in the form of release of electrochemical compounds that cause euphoric, relaxed or sedative, this is what makes combination therapy can be more influential on decreased

anxiety and stability of blood pressure and heart rate (Ganong, 1999).

During music therapy, aromatherapy is inhaled; the volatile molecules of the oil are carried by air to the roof of the nose where the soft cilia arise from the receptor cells. When the molecules attach to the hairs, an electro-chemical message will be transmitted through the sphere and olfactory into the limbic system. This will stimulate the memory and emotional response. The hypothalamus acts as a relay and regulatory, generating messages to the brain and other parts of the body. Received messages are then converted into actions in the form of release of electrochemical compounds that cause euphoria, relax or sedative. The limbic cortex is primarily used for emotional expression systems. Thus this combination proven to be effective on anxiety and non-invasive hemodynamic (Arwani & Hartono, 2012).

CONCLUSION

There was a significant effect of combination therapy (music-aromatherapy) on anxiety, diastolic blood pressure and heart rate. There was no effect on systolic blood pressure. This therapy can be used as an alternative in nursing interventions, and can be used as inputs to develop standard of operational procedure for anxiety and non-invasive hemodynamic stability. This research can also be used as the base of research development on non-pharmacology therapy for patients in the intensive care unit. In addition, the results of this study can serve as a frame of reference for further research on the provision of music therapy and aromatherapy to overcome other health problems, combining between music therapy and aromatherapy with other interventions.

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