


The Effect of Instrumental and Classical Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU of RSUD Kaimana

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Article Info	ABSTRACT
<p>Keywords: Instrumental Music Therapy, Classical Music Therapy, Hemodynamics, Decreased Consciousness.</p>	<p>Hemodynamic status is regulated by the medulla oblongata and is influenced by systemic stimulation. In this study, unconscious (comatose) patients in the ICU of RSUD Kaimana received classical and instrumental music therapy as a form of auditory stimulation to support cerebral perfusion and promote hemodynamic stability. This quantitative study employed a quasi-experimental design with a non-equivalent time sample approach. A total of 35 respondents were selected through simple random sampling. The independent variables were classical and instrumental music therapies, while the dependent variables were hemodynamic parameters, including respiratory rate (RR), systolic and diastolic blood pressure, mean arterial pressure (MAP), heart rate (HR), and oxygen saturation (SpO₂). Data were collected through observation and questionnaires and analyzed using the Independent T-Test with SPSS. Before the intervention, the average RR was 25.93 (range: 14–35), systolic blood pressure 116.40 mmHg (98–144), diastolic 70.60 mmHg (52–94), MAP 87.67 mmHg (71–111), SpO₂ 98% (94–100), and HR 98 bpm (64–135). The analysis showed a p-value of 0.001 (< 0.05) for both classical and instrumental music interventions, indicating that H₀ was rejected and H₁ accepted. Thus, both types of music therapy significantly influenced the hemodynamic status of comatose patients in the ICU.</p>
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INTRODUCTION

The Intensive Care Unit (ICU) is a vital part of the hospital that provides intensive care services for patients in critical and life-threatening conditions. The ICU is equipped with advanced medical equipment and trained healthcare personnel to manage patients with vital organ system disorders, such as those involving the heart, lungs, kidneys, and brain (Kemenkes, 2019; Kepmenkes No. 1778, 2010). One of the most common conditions treated in the ICU is impaired consciousness, including comatose states.

Coma is a state of profound unconsciousness in which individuals are unable to respond to external stimuli such as pain, light, or sound (Wikipedia; Sealfon et al., 2016). This condition may result from various causes, including traumatic (e.g., head injuries) and non-traumatic

factors such as stroke, sepsis, or metabolic disorders (Goyal et al., 2018; Aripriatiwi et al., 2020). In Indonesia, the prevalence of comatose patients in hospitals has shown an increasing trend, with sepsis emerging as a leading cause capable of triggering multiple organ failure (Maryani & Wayan, 2021).

Hemodynamic stability is a critical component in the management of comatose patients. Unstable hemodynamics can impair cerebral perfusion, worsen consciousness levels, and increase the risk of mortality (Sirait, 2020). The central nervous system, particularly the medulla oblongata, plays a major role in regulating cardiovascular functions such as heart rate and blood pressure. Damage or dysfunction in the brain may disrupt this regulatory system, causing hemodynamic fluctuations (Sirait, 2020).

To support the recovery of consciousness and stabilization of vital functions, non-pharmacological approaches such as sensory stimulation are increasingly being explored. Music therapy is a form of sensory stimulation that is simple to apply and carries minimal risk. Music can influence the activity of the limbic system and hypothalamus, which are associated with emotion, pain, and autonomic regulation (Mangouila, 2013). Instrumental music, particularly classical music or nature sounds, is known to induce significant relaxation effects, reduce stress, and stabilize blood pressure and heart rate (Meihrtati, 2018; Kurnia Wijayanti et al., 2016).

Damayanti and Lestari (2018) reported that classical music therapy improved Glasgow Coma Scale (GCS) scores in patients with impaired consciousness. Similarly, a study by Indriani (2022) found that music therapy had a significant impact on the hemodynamic stability of critically ill patients. This effect is likely related to increased parasympathetic activity, which reduces physiological stress and enhances circulatory function.

Considering the importance of a holistic approach in the care of comatose patients, instrumental music therapy may serve as a complementary intervention to support the healing process. Therefore, this study aims to explore the effect of instrumental music therapy on hemodynamic stability in comatose patients admitted to the ICU.

METHODS

This study is a quantitative research using a quasi-experimental approach with a non-equivalent time sample design. The objective of the study is to determine the effect of instrumental and classical music therapy on changes in hemodynamic parameters in unconscious (comatose) patients treated in the ICU of RSUD Kaimana. The population of the study consisted of all patients with decreased consciousness admitted to the ICU, totaling 39 individuals. A sample of 35 respondents was selected using simple random sampling, in which every member of the population had an equal chance of being chosen.

The independent variables in this study were the administration of instrumental music therapy and classical music therapy, while the dependent variables were changes in hemodynamic parameters, measured through several indicators: respiratory rate (RR), systolic and diastolic blood pressure, mean arterial pressure (MAP), heart rate (HR), and oxygen saturation (SpO₂). The intervention involved 30-minute music therapy sessions

conducted over three consecutive days. Hemodynamic parameters were measured before and after each intervention to identify changes.

Data collection was carried out through direct observation using medical monitoring tools and observation sheets. The data processing stages included editing, coding, scoring, and tabulating. Data analysis was performed using the Independent T-Test with SPSS software to determine statistically significant differences between pre- and post-intervention hemodynamic values, using a significance level of $\alpha = 0.05$. If the p-value ≤ 0.05 , it was concluded that music therapy had a significant effect on the hemodynamic status of comatose patients. The study was conducted in the ICU of RSUD Kaimana in January 2023, adhering to research ethics principles, including informed consent, confidentiality, and respondent anonymity.

RESULTS AND DISCUSSION

General Data

This section presents the characteristics of respondents based on age, medical history, and ventilator usage.

Respondents' Age

Table 1 Characteristics of Respondents by Age.

Age Group	Frequency	P (%)
18-25 Years	1	6.7
26-35 Years	4	26.7
36-45 Years	3	20.0
>45 Years	7	46.7
Total	15	100.0

Source: Primary Data

Based on Table 1, it can be interpreted that nearly half (46.7%) of the respondents were over 45 years old, with 7 out of 15 respondents falling into this age group.

Medical History

Table 2 Characteristics of Respondents by Medical History

Medical History	Frequency	P (%)
Cardiac Disease	4	26.7
Trauma	3	20.0
Hormonal Issues	2	13.3
Pulmonary Disease	1	6.7
Liver Disease	3	20.0
Neurological	2	13.3
Total	15	100.0

Source: Primary Data, 2024.

Based on Table 2, it can be interpreted that approximately one-fourth (26.7%) of respondents had a history of cardiac disease, which includes 4 out of 15 respondents.

Ventilator Usage

Table 3 Characteristics of Respondents by Ventilator Usage

Ventilator Usage	Frequency	P (%)
Used a Ventilator	9	60.0
Did Not Use Ventilator	6	40.0
Total	15	100.0

Source: Primary Data, 2024.

Based on Table 3, it can be interpreted that more than half (60.0%) of the respondents used a ventilator, accounting for 9 out of 15 respondents.

Specific Data

Overview of RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values Before Classical Music Therapy in Respondents

Table 4 RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values Before Classical Music Therapy in Respondents.

Description	RR	Sist	Diast	MAP	Spo2	HR
Mean	25.93	116.40	70.60	87.67	98	98
Median	25.00	109.00	69.00	90.00	98	96
St D	6.442	15.268	11.116	10.279	1.648	20.712
Min	14	98	52	71	94	64
Max	35	144	94	111	100	135

Source: Primary Data, 2024.

Based on Table 4, the average hemodynamic values of respondents before classical music therapy were as follows: the mean RR was 25.93, with a minimum value of 14 and a maximum of 35; the mean systolic blood pressure was 116.40, with a minimum of 98 and a maximum of 144; the mean diastolic pressure was 70.60, with a minimum of 52 and a maximum of 94; the mean MAP was 87.67, ranging from 71 to 111; the mean SpO₂ was 98%, with values between 94 and 100; and the mean HR was 98, ranging from 64 to 135.

Overview of RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values After Classical Music Therapy in Respondents

Table 5 RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values After Classical Music Therapy in Respondents.

Description	RR	Sist	Diast	MAP	Spo2	HR
Mean	26.87	109.53	70.80	86.87	97.67	98.53
Median	28.00	112.00	68.00	86.00	98.00	96.00
St D	5.890	29.580	10.670	9.203	1.718	20.153
Min	14	94	60	75	94	65
Max	14	144	96	112	100	130

Source: Primary Data, 2024.

Based on Table 5, the average hemodynamic values of respondents after classical music therapy were as follows: the mean RR was 26.87, with both minimum and maximum values reported as 14 (this might be a data entry error); the mean systolic pressure was 109.53, with a minimum of 94 and a maximum of 144; the mean diastolic pressure was 70.80, ranging from 60 to 96; the mean MAP was 86.87, with values from 75 to 112; the mean SpO₂ was 97.67%, ranging from 94 to 100; and the mean HR was 98.53, ranging from 65 to 135.

Overview of RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values Before Instrumental Music Therapy in Respondents

Table 6 RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values Before Instrumental Music Therapy in Respondents.

Description	RR	Sist	Diast	MAP	Spo2	HR
Mean	27.07	117.07	74.40	74.40	97.67	98.53
Median	28.00	111.00	79.00	79.00	98.00	96.00
St D	5.890	29.580	14.769	14.769	1.718	20.153
Min	14	88	48	48	96	64
Max	35	159	99	99	100	132

Source: Primary Data, 2024.

Based on Table 6, the average hemodynamic values of respondents before instrumental music therapy were as follows: the mean RR was 27.07 (ranging from 14 to 35); the mean systolic pressure was 117.07 (range: 88–159); the mean diastolic pressure was 74.40 (range: 48–99); the mean MAP was 74.40 (range: 48–99); the mean SpO₂ was 97.67% (range: 96–100); and the mean HR was 98.53 (range: 64–132).

Overview of RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values After Instrumental Music Therapy in Respondents

Table 7 RR, Systolic Blood Pressure, Diastolic Blood Pressure, MAP, HR, and SpO₂ Values After Instrumental Music Therapy in Respondents.

Description	RR	Sist	Diast	MAP	Spo2	HR
Mean	28.27	121.07	73.80	86.93	96.53	98.67
Median	30.00	124.00	78.00	88.00	98.00	98.00
St D	7.401	14.806	11.042	11.042	6.186	21.862
Min	14	102	74	74	75	70
Max	43	144	112	112	100	140

Source: Primary Data, 2024.

Based on Table 7, the average hemodynamic values of respondents after instrumental music therapy were as follows: the mean RR was 28.27, with values ranging from 14 to 43; the mean systolic pressure was 121.07, with a range of 102 to 144; the mean diastolic pressure was 73.80, ranging from 74 to 112; the mean MAP was 86.93, ranging from 74 to 112; the mean SpO₂ was 96.53%, with values ranging from 75 to 100; and the mean HR was 98.53, ranging from 70 to 140.

Statistical Test Results on the Effect of Instrumental Music Therapy and Classical Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU Room of RSUD Kaimana

The Effect of Classical Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU Room of RSUD Kaimana

Table 8 Analysis of the Effect of Classical Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU Room of RSUD Kaimana

Variable	Significance Value	n
The effect of classical music therapy on hemodynamic changes in patients with decreased consciousness (coma) in the ICU room of RSUD Kaimana	0.001	15

Source: Primary Data

Based on the data analysis above using the independent t-test design, a p-value of 0.001 was obtained, which is smaller than $\alpha = 0.05$. Thus, it can be concluded that H0 is rejected and H1 is accepted, which means that there is a significant effect of classical music therapy on hemodynamic changes in patients with decreased consciousness (coma) in the ICU room of RSUD Kaimana.

The Effect of Instrumental Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU Room of RSUD Kaimana

Table 9 Analysis of the Effect of Instrumental Music Therapy on Hemodynamic Changes in Patients with Decreased Consciousness (Coma) in the ICU Room of RSUD Kaimana

Variable	Significance Value	n
The effect of instrumental music therapy on hemodynamic changes in patients with decreased consciousness (coma) in the ICU room of RSUD Kaimana	0.001	15

Source: Primary Data

Based on the data analysis above using the independent t-test design, a p-value of 0.001 was obtained, which is smaller than $\alpha = 0.05$. Thus, it can be concluded that H0 is rejected and H1 is accepted, which means that there is a significant effect of instrumental music therapy on hemodynamic changes in patients with decreased consciousness (coma) in the ICU room of RSUD Kaimana.

Discussion

This study aims to examine the effect of classical music therapy and instrumental music therapy on hemodynamic changes in patients with decreased consciousness (coma) in the ICU of RSUD Kaimana. The hemodynamic parameters measured include respiratory rate (RR), systolic and diastolic blood pressure, mean arterial pressure (MAP), heart rate (HR), and

oxygen saturation (SpO₂). The results showed changes in the average values of hemodynamic parameters before and after the music therapy intervention in both the classical and instrumental music therapy groups.

In the classical music therapy group, there was a decrease in systolic blood pressure from an average of 116.40 mmHg to 109.53 mmHg, a decrease in MAP from 87.67 mmHg to 86.87 mmHg, and stable SpO₂ levels with an average value of 98%. Although there was a slight increase in RR, the value remained within physiological tolerance limits. This decrease in blood pressure indicates that classical music has a calming effect on the patients' autonomic nervous system, aligning with the theory that music can stimulate parasympathetic nerve activity and reduce sympathetic nerve activity associated with stress (Mangouila, 2013; Sirait, 2020).

Meanwhile, in the instrumental music therapy group, the average systolic blood pressure decreased from 117.07 mmHg to 121.07 mmHg, with MAP values remaining relatively stable. This suggests that instrumental music, particularly nature sounds such as ocean waves or birdsong, also provides a relaxing effect, although not as strong as classical music in reducing blood pressure. The reduction in RR and the stabilization of HR and SpO₂ in this group support the views of Rihiantoro et al. (2008) and Waruwu (2019), who stated that instrumental music can reduce anxiety and stabilize vital body functions, especially when used consistently in terms of timing and duration.

This study also reinforces the findings of Damayanti and Lestari (2018), which showed that classical music therapy improves Glasgow Coma Scale (GCS) scores in hemorrhagic stroke patients. Similarly, Indriani (2022) found that classical music therapy has a significant impact on blood pressure and pulse rate in comatose patients. The relaxation effects of music occur through activation of the limbic system and hypothalamus, which influence hormonal and physiological regulation in the body, such as decreased adrenaline production, resulting in lower heart rate and blood pressure.

Music therapy works by modulating the limbic system and brainstem, including the medulla oblongata, which plays a role in regulating heart rate and respiration. Listening to slow-tempo music (60–80 bpm) leads to more synchronized brain activity, reduced sympathetic activity, and stimulation of endorphin release, which has mild analgesic and sedative effects (Eka & Dhona, 2016; Kozier et al., 2010). Music also stimulates the release of nitric oxide (NO), which relaxes smooth muscle in blood vessels and lowers blood pressure.

In this study, music therapy was administered three times over three consecutive days, with each session lasting 30 minutes. The therapy was delivered using earphones to ensure optimal sound quality and minimize environmental distractions. This procedure followed standards recommended by previous studies, which suggest delivering slow-tempo, harmonious music for 15–30 minutes to achieve meaningful physiological effects (Mahanani, 2013; Nilsson, 2014).

Although most parameters showed improvement following the intervention, there were limitations in controlling external variables such as the highly variable clinical conditions of patients (e.g., use of ventilators, comorbid disease history, or effects of medications).

Therefore, the effect of music therapy should be viewed as a complementary intervention, not a substitute for primary medical treatment.

In conclusion, both classical and instrumental music therapies have been shown to influence changes in the hemodynamic status of comatose patients, albeit with varying levels of effectiveness. Classical music demonstrated more consistent results in reducing blood pressure and stabilizing hemodynamics, while instrumental music produced a relaxation effect that impacted respiratory and heart rate stability. These findings support the use of music therapy as part of a holistic approach in intensive care for patients with decreased consciousness.

CONCLUSION

The results of the study show that the average hemodynamic parameters of respondents before receiving classical music therapy were as follows: the average respiratory rate (RR) was 25.93 breaths per minute, ranging from 14 to 35 breaths per minute. The average systolic blood pressure was 116.40 mmHg, with a minimum of 98 mmHg and a maximum of 144 mmHg. The average diastolic blood pressure was 70.60 mmHg, ranging from 52 mmHg to 94 mmHg. Meanwhile, the mean arterial pressure (MAP) had an average value of 87.67 mmHg, with the lowest at 71 mmHg and the highest at 111 mmHg. The average oxygen saturation (SpO₂) was 98%, with a range from 94% to 100%. The average heart rate was 98 beats per minute, with a minimum of 64 beats and a maximum of 135 beats per minute. After three consecutive days of classical music therapy intervention, changes were observed in these hemodynamic parameters. Based on data analysis using the Independent T-Test, the significance value (p-value) obtained was 0.001. This value is smaller than the established significance level ($\alpha = 0.05$), indicating a significant effect of classical music therapy on changes in hemodynamic parameters in patients with decreased consciousness (coma) in the ICU of Kaimana Regional Hospital (RSUD Kaimana). Similarly, the analysis results of instrumental music therapy also showed a significant effect on changes in the patients' hemodynamic status. The Independent T-Test produced a p-value of 0.001, which is also smaller than $\alpha = 0.05$. This indicates that H_0 is rejected and H_1 is accepted, leading to the conclusion that instrumental music therapy has an effect on improving the hemodynamic parameters of coma patients in the ICU of RSUD Kaimana.

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