

The Effectiveness of Virtual Reality-Based Balinese Gamelan Selonding (Gambling) Music On Anxiety And Blood Pressure In The Elderly

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Abstract.

Aging brings with it the consequence of an increase in various cardiovascular diseases, one of which is hypertension. Long-term use of antihypertensive drugs can cause various side effects, one of which is mental changes, thus non-pharmacological therapies such as music therapy are needed. There are many types of music therapy that can be applied, one of which is traditional music (gamelan). There are inconsistencies in previous research, so a combination of Balinese gamelan selonding music therapy with VR or Virtual Reality is needed. VR has become one of the leading innovations in the field of health and wellness, especially in the context of therapy and rehabilitation. The purpose of this study is to determine the effectiveness of VR-based Balinese gamelan selonding music therapy in reducing anxiety and blood pressure in the elderly with hypertension. The research method uses a quasi-experimental pre-post control group design. The sampling technique is purposive sampling according to inclusion and exclusion criteria. The instruments in this study used an anxiety questionnaire, tensimeter, MP3/handphone, earphones and a VR Box. The results of this study show that the provision of VR-based Balinese gamelan selonding music therapy can reduce anxiety and blood pressure in the elderly.

Keywords: Balinese Selonding Music Therapy; Virtual Reality; Hypertension; Anxiety.

1. INTRODUCTION

The World Health Organization (WHO) defines the elderly population as those aged 60 years and older. In 2019, the number of people aged 60 and over reached 1 billion. This number is expected to increase to 1.4 billion in 2030 and 2.1 billion in 2050.(World Health Organization, 2023). The increase in the number of elderly people in the future can have positive and negative impacts, positive impacts if the elderly are in a healthy, active and productive condition, on the other hand, negative impacts if the elderly are sick and weak which will become a burden for themselves, their families and the country.(Wardani, 2020). Advanced age brings consequences of increasing various cardiovascular diseases, one of the cardiovascular diseases that is often experienced by the elderly is hypertension.(Oktaviani et al., 2021). Based on the Indonesian Health Profile, the most common diseases in the elderly are non-communicable diseases (NCDs), one of which is hypertension. The estimated number of diagnosed hypertension cases in 2021 was 25.8%, then increased in 2022 to 34.5%.(Ministry of Health of the Republic of Indonesia, 2022)Bali Health Profile data for 2023 shows the prevalence of hypertension is 71.8%, with the highest prevalence in Denpasar.(Bali Provincial Health Office, 2023)The prevalence of hypertension in Denpasar City is 15,914, with the highest prevalence in the West Denpasar II Community Health Center (Puskesmas Barat II) area, with 2,283 cases. Hypertension is categorized as one of the most common comorbidities, requiring an annual budget of Rp 5.4 trillion.(Coordinating Ministry, 2021)The Indonesian government has implemented Posbindu-based non-communicable disease (NCD) surveillance and pharmacological therapy. However, these efforts have not yet yielded optimal results. Long-term use of antihypertensive medications can cause various side effects.(Astuti et al., 2019)The side effects of medication use in the elderly have more significant impacts, such as osteoporosis, kidney failure, and mental changes, so non-pharmacological treatment is highly prioritized.(Winarto et al., 2021)One of the non-pharmacological therapies used for nursing interventions is music therapy. Music therapy is one of the easiest, cheapest, and safest non-pharmacological therapies to use, but its use is still limited in reducing blood pressure and anxiety in hypertensive patients.(Artana et al., 2020).. The types of music therapy that can be applied are classical music and traditional music (gamelan), choosing the right music is important because listening to favorite music triggers different changes compared

to foreign melodies in reducing blood pressure.(Ho et al., 2020).. The light rhythm of music provides a movement of sound that can adjust the reception of waves in the ear, the type of traditional Balinese music that can be used as therapy is the gamelan selonding which has a soft and calming melody so that it is suitable for the elderly, the uniqueness of the classical musical nuances with the pelog sapta nada (seven notes) scale that it has makes the gamelan selonding an attraction that is able to captivate every audience who listens to it.(Yudhawati et al., 2022).. Other studies have shown that music therapy is effective in reducing a person's anxiety, but there are also research results that say that music therapy does not have a significant effect in reducing a person's anxiety.(Widiana, 2019), so it needs to be done combination therapy Balinese gamelan music selonding with one of them being a combination of VR or Virtual reality. VR has become one of the leading innovations in health and wellness, particularly in the context of therapy and rehabilitation.(Gall et al, 2023) VR combines visual, audio, and kinesthetic sensory modalities. This combination of sensory modalities is more effective in reducing anxiety and blood pressure than stimulating one sense alone.(Yulianti et al., 2019) Currently, research on the effectiveness of VR-based Balinese gamelan music therapy (gambling) on anxiety and blood pressure in elderly people with hypertension is still scarce, and no similar studies were found during the researchers' search. Furthermore, Bali is currently being prepared to become a leading health tourism destination.(Hendriyani, 2020). This further strengthens the implementation of Balinese gamelan music therapy intervention as a non-pharmacological therapy to reduce blood pressure and anxiety so that researchers have a great opportunity to conduct this research considering that Balinese gamelan is very diverse and is not only used for religious purposes but can also be used in the health sector. This research is very important to do to determine the effectiveness of VR-based Balinese gamelan music therapy (gambling) on anxiety and blood pressure in elderly people with hypertension, and this research is relevant to the value of Asta Cita 4, especially in the fields of technology and health. The formulation of the problem in this study is whether VR-based Balinese gamelan music therapy (gambling) can reduce anxiety and blood pressure in elderly people with hypertension. The goal to be achieved is to prove the effectiveness of VR-based Balinese gamelan music therapy (gambling) on anxiety and blood pressure in elderly people with hypertension.

II. METHODS

This study used a quasi-experimental research design using a pre-test and post-test with a control group design consisting of two groups: group 1 (control) was given educational media in the form of leaflets and group 2 (experimental) was given Balinese slonding music therapy based on virtual reality. A pre-test was conducted, followed by an intervention on the experimental and control groups, followed by a post-test on the experimental and control groups. The population in this study were hypertensive patients at the UPTD Health Center 2 West Denpasar, with inclusion criteria being elderly patients medically diagnosed with hypertension by a doctor, hypertensive patients registered in the working area of Health Center 2 West Denpasar, and willing to be research subjects until completion by signing an informed consent. Exclusion criteria were pediatric patients, experiencing mental disorders. This study used a sample of 56 people in group 1 and 56 people in group 2. The sampling method used was a purposive sampling technique. The data in this study will be analyzed using the SPSS program for Windows version 22.0.

III. RESULT AND DISCUSSION

Subject Characteristics

Table 1. Distribution of Respondents by Gender (n=56)

Variables	N	Average	Min	Max	Elementary School
Intervention Age	28	64	61	70	2.95
Age Control	28	64.5	61	70	3.25

Based on table 1 showsthat the average age of respondents was 64 years in the intervention group and 6 with the highest age being 12 years and the lowest being 9 years.

Table 2. Distribution of Respondents According to Employment Status and Education (n=56)

Characteristics	Intervention Group		Control Group	
	f	%	f	%
Age				
60-74 Years	17	56.7	20	66.7
75-90 Years	10	33.3	6	20
> 90 Years	3	10	4	13.3
Gender				
Man	19	67.9	15	53.6
Woman	9	32.1	13	46.4
Employment Status				
Work	10	35.7	12	42.9
Doesn't work	18	64.3	16	57.1
Education				
No school	7	25.0	3	10.7
Elementary-Middle School	12	42.9	11	39.9
SENIOR HIGH SCHOOL	9	32.1	9	32.1
S1-S3	0	0	5	17.9
Total	56	100	56	100

Table 2 shows data on male respondents, with 19 respondents (67.9%) in the intervention group and 15 respondents (53.6%) in the control group. The most common employment status was unemployed, with 18 respondents (64.4%) in the intervention group and 16 respondents (57.1%) in the control group. The most common educational attainment was elementary school (SD)-junior high school (SMP), with 12 respondents (42.8%) in the intervention group and 11 respondents (39.9%) in the control group.

Table 3. Anxiety Levels Before and After Being Given Virtual Reality-Based Balinese Selonding Gamelan Music Therapy (GAMBLING)

Anxiety		n	%
Intervention Group			
<i>Pre-test</i>	Light	12	42.9
	Currently	14	50.0
	Heavy	2	7.1
<i>Post-test</i>	There isn't any	8	28.6
	Light	18	64.3
	Currently	2	7.1
Control Group			
<i>Pre-test</i>	Mild anxiety	9	32.1
	Moderate anxiety	15	53.6
	Severe anxiety	4	14.3
<i>Post-test</i>	No worries	5	17.9
	Mild anxiety	14	50.0
	Moderate anxiety	9	32.1
Total		56	100

Table 3 shows that in the intervention group, the pre-test results showed that most respondents (50%) experienced moderate anxiety, and in the post-test results, most respondents experienced mild anxiety (64.3%). In the pre-test results in the control group, the majority of respondents (53.6%) experienced moderate anxiety, and in the post-test, most respondents experienced mild anxiety (64.3%).

Table 4. Blood Pressure Before and After Being Given Virtual Reality-Based Balinese Selonding Gamelan Music Therapy (GAMBLING)

	Variables	n	%
Intervention Group			
<i>Pre-test</i>	Pre-Hypertension	8	28.6
	Grade 1 Hypertension	14	50.0
	Grade 2 Hypertension	6	21.4
<i>Post-test</i>	Pre-Hypertension	13	46.4
	Grade 1 Hypertension	15	53.6
	Grade 2 Hypertension	0	0
Control Group			
<i>Pre-test</i>	Grade 1 Hypertension	13	46.4
	Grade 2 Hypertension	15	53.6
<i>Post-test</i>	Pre-Hypertension	3	10.7
	Grade 1 Hypertension	23	82.1
	Grade 2 Hypertension	2	7.1
Total		56	100

Table 4 shows that in the intervention group, during the pre-test, most respondents (50%) experienced moderate grade 1 hypertension, and during the post-test, most respondents experienced grade 1 hypertension (53.6%). The blood pressure results of the control group during the pre-test, most respondents (53.6%) experienced moderate grade 2 hypertension, and during the post-test, most respondents experienced grade 1 hypertension (82.1%).

Table 5. Effectiveness of Virtual Reality-Based Balinese Selonding (Gambling) Music Therapy on Anxiety and Blood Pressure in Elderly People with Hypertension

	Blood Pressure in the Intervention Group	Anxiety Level in the Intervention Group	Blood pressure in the control group	Anxiety Level in the Control Group
Z	-2,653	-4,899	-3,557	-4,359
Asym. Sig	0.008	0.000	0.000	0.000

Table 5 shows where the significance value of the Wilcoxon Signed Rank Test results is mostly 0.000. When examined based on the assessment criteria of the Wilcoxon signed rank test, the significance value obtained of 0.000 is greater than 0.05, which means the hypothesis of a significant difference in the level of anxiety and blood pressure in the elderly before and after being given the effectiveness of virtual reality-based Balinese gamelan selonding (GAMBLING) music therapy.

DISCUSSION

Anxiety levels before and after being given virtual reality-based Balinese Gamelan Selonding (GAMBLING) music therapy

The results of the study showed that 28 respondents from the intervention group, where before being given therapy, the average respondent was at a moderate level of anxiety of (50%), and after being given therapy, most respondents were at a mild level of anxiety of (64.3%) and no anxiety of (28.6%), while in the Control group, the results of the study were obtained, namely before being given therapy, most respondents were at a moderate level of anxiety of (53.6%), after being given therapy, most respondents were at a mild level of anxiety of (50%).

Hypertension can cause psychological threats, namely that hypertension sufferers will experience excessive stress and anxiety because it requires treatment for a long time and can cause serious disease complications.(Inayati and Aini, 2023). Untreated stress can cause impacts such as, easily and frequently

tired, difficulty starting to sleep, pain in the muscles, headaches and backaches, having skin problems, high blood pressure, panic, digestive disorders, if the condition of stress in the elderly is not immediately treated can cause more serious mental problems in the elderly. (Suidah and Cahyono, 2020).

Research conducted by (Yudhawati, 2022), where respondents who were given gamelan music therapy were able to reduce their anxiety levels. This research is also in line with research conducted by (Artana, Widiyani and Dewi, 2022) also shows that classical music therapy given consistently can reduce anxiety levels by causing a relaxing effect. Low levels of anxiety will have an impact on a good quality of life, and vice versa, one of the factors that causes respondents to have mild anxiety, but have a poor quality of life is a lack of physical activity, a high level of anxiety but a good quality of life due to environmental factors, lifestyle, support, and the availability of good information, anxiety factors such as the environment, physical, and the spread of false information can also worsen mental health conditions (Kunoviana and Maliya, 2025).

Blood pressure before and after being given Virtual Reality-based Gambelan Bali Selonding (Gambling) music therapy

The results of the study in the intervention group showed During the pre-test, most respondents (50%) experienced moderate grade 1 hypertension and during the post-test, most respondents experienced grade 1 hypertension (53.6%), while in the control group, during the pre-test, most respondents (53.6%) experienced moderate grade 2 hypertension and during the post-test, most respondents experienced grade 1 hypertension (82.1%).

The use of music therapy is a therapeutic intervention that can help overcome hypertension by reducing risk factors associated with cardiovascular disorders, thereby achieving an anti-hypertensive effect. (Martiniano et al., 2019) Music therapy can reduce the sympathetic nervous system's response, thus lowering vital signs such as heart rate, respiration, oxygenation, and blood pressure. This process releases the hormone noradrenaline into the body's circulation, which can increase levels of relaxation and calmness, as well as improve sleep quality. (Lorber & Divjak, 2022)

According to research (Collins et al., 2021) showed that nine studies related to music therapy can lower blood pressure in people with hypertension with an average reduction in systolic pressure of 10-29 mmHg and diastolic pressure of 2-16 mmHg. This research is also in line with research conducted by (Khaliri and Ramadhanti, 2023) Regularly performing campursari music therapy can lower blood pressure in elderly people with hypertension. Furthermore, applying campursari music therapy can provide a relaxing effect for the elderly.

Music therapy is a complementary therapy that can be performed by nurses, in accordance with the Indonesian Minister of Health Regulation No. 26 of 2019, Article 21, paragraph 1, in carrying out their duties as nursing care providers, nurses have the authority to carry out complementary and alternative nursing management. Implementing this music therapy is one of the easy interventions to lower blood pressure. The music that can be used is music that is often listened to in everyday life, such as popular music, instrumental music, and classical music.

The effectiveness of Virtual Reality-based Balinese Gambelan Selonding (Gambling) music therapy on anxiety and blood pressure in elderly with hypertension

Results The study shows that providing Virtual Reality-based Gambelan Bali Selonding (Gambling) music therapy can reduce anxiety and blood pressure in elderly people with hypertension with the Wilcoxon signed rank test with a significance value of 0.000.

There is Two therapies that can be used to treat hypertension are pharmacological therapy and non-pharmacological therapy. Pharmacological therapy is therapy using antihypertensive drugs such as diuretics, alpha adrenergic, beta-blockers (BB), vasodilators, calcium antagonists or calcium channel blockers (CCB), angiotensin converting enzyme (ACE), and angiotensin receptor blockers or angiotensin receptor blockers (ARBs). (Cahyanti and Hirmawati, 2021).

A decrease in systolic and diastolic blood pressure are two indicators that using natural music therapy can affect blood pressure. To ensure that the pre- and post-test results from the therapy phase during the study were not affected, the study participants were elderly hypertensive patients receiving

antihypertensive medication between therapy sessions. However, when conducted three times a week, the study revealed that the respondents' blood pressure was affected not only by the effects of music therapy but also by elements related to pharmacological therapy. This suggests that for elderly hypertensive patients, this therapy can be used in addition to pharmacological therapy. (Rusmadhani and Dafid, 2024).

Research conducted by (Aprilia and Arifiyanto, 2023) revealed that providing religious music for 15 minutes a day for seven days to control hypertension in the elderly in the Sragi Community Health Center Work Area, the average systolic blood pressure dropped to 146.6 mmHg from 153.4 mmHg, simultaneously, diastolic blood pressure dropped from 92.3 mmHg to 89 mmHg. This research is also in line with research conducted by (Sulistiyarini, 2021) where using a slow tempo natural music genre of 60-90 bpm selected based on the comfort level of the respondents, the type of music that should be used for therapy has a relaxed rhythm of around 60 beats per minute, a decrease in systolic and diastolic blood pressure is one of the research findings on the impact of natural music therapy on blood pressure regulation.

The mechanism of music therapy is by providing a relaxing and comfortable effect on the body because music enters through the auditory organs and then stimulates the hypothalamus in the brain stem so that it does not react too strongly to the stressor it receives, music will stimulate the pituitary to release endorphins, when endorphins are released by the brain and activate the parasympathetic system, it will reduce blood pressure, pulse, respiration, and provide a relaxing effect on the body, reducing neuropeptide secretion can result in a decrease in the release of catecholamines so that there is a decrease in blood pressure, heart rate, and blood pressure. (Akbar, Merdekawati and Sari, 2022).

IV. CONCLUSION

Based on the intervention given, Balinese gamelan selonding (Gambling) music therapy based on virtual reality can reduce anxiety and blood pressure in the elderly. This therapy can be used as an alternating approach along with pharmacological treatment and can be applied as an alternative independent nursing intervention for the elderly with hypertension.

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