

## The Effect of Virtual Reality Therapy on Stress Levels in Hypertension Sufferers

**Firyal**

Kemiri Muka Community Health Center

Jl. Ciliwung No.12, Kemiri Muka, Kecamatan Beji, Kota Depok, Jawa Barat 16423

Email: [fialfiryal537@gmail.com](mailto:fialfiryal537@gmail.com)

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### Abstract

**Background:** Hypertension is often referred to as The Silent Killer, which is a deadly disease without any signs and symptoms. Hypertension can occur due to various factors, including stress. Stress is a condition that everyone can experience, it can stimulate the sympathetic nervous system, which ultimately increases blood pressure.

**Objectives:** This research was conducted to determine the effect of virtual reality therapy on stress levels in hypertension sufferers at Posbindu Buncis in the Kemiri Muka Community Health Center Working Area, Depok City in 2022.

**Methods:** The research used quantitative research with a quasi-experiment research design with a two-group pre-test and post-test with a control approach. The population of this study was 40 respondents. The sampling technique used was non-probability sampling with the type of Purposive Sampling. Data were collected using the standard Depression Anxiety Stress Scales questionnaire which consists of 42 questions asked to respondents before and after treatment.

**Results:** The results of the Wilcoxon test on the pre-test and post-test show that the interpreted value of the Wilcoxon test is that if  $Asymp.Sig < 0.05$  then the hypothesis can be accepted.

**Conclusion:** So it can be concluded that  $H_a$  is accepted and  $H_0$  is rejected, which means that there is an influence of virtual reality therapy on stress levels in hypertension sufferers at Posbindu Buncis in the Kemiri Muka Health Center Working Area, Depok City in 2022.

**Keywords:** hypertension, stress, virtual reality

### Introduction

One of the health problem phenomena that most frequently occurs in global society, both in developed and developing countries, is high blood pressure or hypertension. Hypertension is the number one cause of death in the world every year. Hypertension is often referred to as The Silent Killer, which is a deadly disease without any signs and symptoms.<sup>1</sup> Hypertension can occur due to various factors, including stress. Stress is a condition that can

stimulate the sympathetic nervous system, which ultimately increases blood pressure.<sup>2</sup> Based on the prevalence of hypertension in West Java province, it is among the five largest provinces which have the highest prevalence of hypertension with 48,161 (29.4%) cases with an age range of more than 18 years spread across 29 regencies/cities. Based on data from the Depok City Health Service in 2019, hypertension was in third place with 22,077 cases (9.02%) in outpatient diseases at the Depok City Health Profile Hospital, 2019.<sup>3</sup>

An increase in cases of high blood pressure caused by stress is a sign that this disease must be treated immediately. Management of patients suffering from hypertension can include both pharmacological and non-pharmacological therapy. Pharmacological therapy is in the form of antihypertensive drugs, while non-pharmacological therapy involves lifestyle interventions such as exercise therapy and herbal medicine therapy.<sup>4</sup> Non-pharmacological therapy has now become an alternative choice for some hypertension sufferers. The main thing that makes non-pharmacological therapy an alternative choice is that in terms of costs, non-pharmacological therapy is more affordable than pharmacological therapy which can cause side effects in some patients.<sup>5</sup>

Non-pharmacological therapy in the current era of globalization can utilize technology, which currently has very rapid progress (Aprilia, 2022). Therapy using virtual reality media is one way or method to reduce stress by diverting the patient's attention, so that the stress felt by the patient is diverted. It is hoped that the level of high blood pressure in hypertension sufferers can decrease, because the stress level in the patient will be reduced.<sup>6</sup>

Based on the background and phenomena above, it was found that stress in hypertension sufferers must be treated immediately by carrying out stress management using virtual reality therapy. Therefore, researchers are interested in conducting virtual reality therapy research on stress levels in hypertension sufferers at Posbindu Buncis in the Kemiri Muka Community Health Center Working Area, Depok City in 2022.

## Method

The research used quantitative research with a quasi-experimental research design with a two group pre-test and post-test with control approach. The population of this study was 40 respondents. The sampling technique used was non-probability sampling with Purposive Sampling type, the sample size was 40 people. Data were collected using the standard Depression Anxiety Stress Scales questionnaire which consists of 42 question items asked to respondents before and after treatment. The collected data was then analyzed using univariate analysis and bivariate analysis. To determine the effect of virtual reality therapy on stress levels in hypertension sufferers at Posbindu Buncis, Kemiri Muka Health Center Working Area, Depok City in 2022, the Wilcoxon rank test statistic was used.

## Results

**Table 1.** Frequency Distribution of Respondents Based on Age and Gender of Hypertension Sufferers at Posbindu Buncis Working Area of Kemiri Muka Health Center, Depok City

Variable	Frequency	Percentage (%)
<b>Age</b>		
45-59 years old	30	75.0
> 60 years	10	25.0
Total	40	100.0
<b>Gender</b>		
Man	13	32.5
Woman	27	67.5

Total	40	100.0
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Based on [table 1](#), this study shows that the majority of respondents who suffer from hypertension are aged 45-59 years, amounting to 30 people (75%) respondents, and those aged > 60 years amounting to 10 people (25%) respondents. Frequency distribution of respondents based on gender among hypertension sufferers at Posbindu Buncis, Kemiri Muka Health Center Working Area, Depok City, the majority of respondents were female, numbering 27 (67.5%) respondents, followed by men, namely 13 (32.5%) respondents.

**Table 2.** Pre-Test Results of Intervention Group Stress Levels for Hypertension Sufferers at Posbindu Buncis Working Area of Kemiri Muka Community Health Center, Depok City, 2022

Stress level	Frequency	Percentage (%)
Normal	0	0.0
Mild Stress	6	30.0
Moderate Stress	9	45.0
Severe Stress	5	25.0
Very Severe Stress	0	0.0
Total	20	100.0

[Table 2](#) shows that the stress level of hypertension sufferers before the intervention was mostly experiencing moderate stress, namely 9 people (45%), 6 people experiencing mild stress (30%) and 5 people experiencing severe stress (25%).

**Table 3.** Pre-Test Results of Control Group Stress Levels for Hypertension Sufferers at Posbindu Buncis Working Area of Kemiri Muka Community Health Center, Depok City, 2022

Stress level	Frequency	Percentage (%)
Normal	0	0.0
Mild Stress	7	35.0
Moderate Stress	8	40.0
Severe Stress	5	25.0
Very Severe Stress	0	0.0
Total	20	100.0

[Table 3](#) shows that the stress level of hypertension sufferers before the intervention was mostly experiencing moderate stress, namely 8 people (40%), 7 people experiencing mild stress (35%) and 5 people experiencing severe stress (25%).

**Table 4.** Post-Test Results of Intervention Group Stress Levels for Hypertension Sufferers at Posbindu Buncis Working Area of Kemiri Muka Community Health Center, Depok City, 2022

Stress level	Frequency	Percentage (%)
Normal	0	0.0
Mild Stress	16	80.0
Moderate Stress	2	10.0
Severe Stress	2	10.0
Very Severe Stress	0	0.0
Total	20	100.0

Based on [table 4](#), the results of the stress level of hypertension sufferers after the virtual reality therapy intervention were carried out on 16 people (80%) who experienced mild stress, 2 people (10%) who experienced moderate stress, and 2 people (10%) who experienced severe stress.

**Table 5.** Post-Test Results of Control Group Stress Levels for Hypertension Sufferers at Posbindu Buncis, Kemiri Muka Community Health Center Working Area, Depok City, 2022

Stress level	Frequency	Percentage (%)
Normal	0	0.0
Mild Stress	10	50.0
Moderate Stress	6	30.0
Severe Stress	4	20.0
Very Severe Stress	0	0.0
Total	20	100.0

Based on [table 5](#), the results of the stress level of hypertension sufferers after the virtual reality therapy intervention were carried out on 10 people (50%) who experienced mild stress, 6 people (30%) who experienced moderate stress, and 4 people (20%) who experienced severe stress.

**Table 6.** Results of the Wilcoxon Test on the Effect of Virtual Reality Therapy on Stress Levels in Hypertension Sufferers at Posbindu Buncis in the Working Area of the Kemiri Muka Community Health Center, Depok City, 2022

		N	Mean Rank	P-Value
Post-Test Intervention Group-Pre-Test Intervention Group	Negative Ranks	20 <sup>a</sup>	10,50	,000
Control Group Post-Test	Negative Ranks	20 <sup>d</sup>	10,50	,000

Based on [table 6](#) above, the results obtained from negative ranks or the difference (negative) between the stress level results for the pre-test and post-test. In the output table above there are 20 negative data (N), which means that 20 respondents experienced a decrease in stress levels from the pre-test value. to post-test scores. The mean rank or average decrease is 10.50. The basis for decision making in the Wilcoxon test is that if the p-value (Asymp.Sig) < 0.05, then the hypothesis is accepted. If the p-value (Asymp.Sig) > 0.05, then the Hypothesis is rejected. The P-Value (Asymp.Sig 2-tailed) is worth 0.000 because the value 0.000 is smaller than 0.05 (0.000 < 0.05) so it is concluded that "Hypothesis accepted" means there is a difference between the stress level results for the pre-test and post-test, so it can be concluded that "There is an influence of virtual reality therapy on the stress level of hypertension sufferers"

**Table 7.** Results of the Mann Whitney Test on the Effect of Virtual Reality Therapy on Stress Levels in Hypertension Sufferers at Posbindu Buncis in the Working Area of the Kemiri Muka Community Health Center, Depok City, 2022

Stress Level	Intervention group		Control group	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Normal	0.0	0.0	0.0	0.0
Mild Stress	30.0	80.0	35.0	50.0
Moderate Stress	45.0	10.0	40.0	30.0
Severe Stress	25.0	10.0	25.0	20.0
Very Severe Stress	0.0	0.0	0.0	0.0

<b>Mean Ranks</b>	15.08	25.93
<b>P-Value</b>	0.002	

Based on [table 7](#) above, it is found that the basis for decision making is if the P-Value (Asymp.Sig.)  $< 0.05$  then the Hypothesis is accepted. If the P-Value (Asymp.Sig.)  $> 0.05$  then the hypothesis is rejected. Asymp.Sig.(2-tailed) value is  $0.002 < 0.05$ . So it can be concluded that "The hypothesis is accepted". Thus, it can be said that there is a difference in the stress level of hypertension sufferers between the intervention group (virtual reality therapy) and the control group (antihypertensive medication). Because there is a significant difference, it can be said that "There is an influence of virtual reality therapy on the stress levels of hypertension sufferers".

## Discussion

Based on the results of univariate analysis on the age frequency distribution with a total of 40 respondents in the Posbindu Buncis Working Area of the Kemiri Muka Public Health Center, Depok City in 2022, the majority of respondents who suffer from hypertension are respondents aged 45-59 years, totaling 30 people (75%), followed by respondents with Age  $> 60$  years as many as 10 people (25%). Previous research stated that the prevalence of stress levels in hypertension sufferers increases significantly with increasing age, especially in the pre-elderly group.<sup>7</sup> In this study, the age group that had a higher risk of experiencing stress compared to other age groups, namely (75%) was the group aged 45-59 years.<sup>8</sup>

The results of the univariate analysis of the results of the gender frequency distribution with a total of 40 respondents in the Posbindu Buncis Working Area of the Kemiri Muka Public Health Center, Depok City. In 2022, the majority of respondents who suffered from hypertension were mostly female respondents, totaling 27 people (67.5%), followed by There were 13 male respondents (32.5%). Based on previous research, it is stated that there are factors related to stress levels in hypertension sufferers, one of which is gender. In his research, it was explained that the prevalence of stress in female hypertension sufferers was 32 people (80%) higher, compared to male respondents, 8 people (20%) out of 40 respondents.<sup>9</sup>

The results of the univariate analysis describe the level of stress in hypertension sufferers before the pre-test was carried out, the intervention group experienced more moderate stress, namely 9 people (45%), followed by those who experienced mild stress, 6 people (30%), and those who experienced severe stress, 6 people (30%). 5 people (25%). Based on previous research regarding the relationship between stress levels and the incidence of hypertension, it was stated that of the 47 respondents who experienced moderate stress, there were 25 people (53.2%), followed by mild stress, 15 people (31.9%) and severe stress, 7 people (14.9%).<sup>10</sup>

The results of the univariate analysis describe the level of stress in hypertension sufferers during the pre-test in the control group who did not receive any treatment or intervention, but the control group took antihypertensive medication in terms of the stress level of respondents with hypertension. The results showed that 8 people (40%) experienced moderate stress, followed by 7 people who experienced mild stress (35%), and 5 people who experienced severe stress (25%). Based on previous research regarding the relationship between stress levels and the incidence of hypertension, it was stated that 34 people experienced moderate stress (44.7%), followed by 29 people (38.2%) who experienced moderate stress and 6 people (7.9%) who experienced moderate stress.<sup>11</sup>

In the results of the stress level of hypertension sufferers after being given Virtual Reality therapy intervention, there were 16 people (80%) who experienced mild stress, 2 people (10%) experienced moderate stress, and 2 people (10%) experienced severe stress. This proves

that the stress level of hypertension sufferers after being given Virtual Reality therapy intervention has decreased. Related research, which is in line, states that Virtual Reality therapy is able to reduce stress levels in 18 teacher respondents at SLBN Purbalingga. From this research, the results of stress levels before being given the intervention were 8 people who experienced mild stress, followed by 8 people who experienced moderate stress, and 9 people who experienced 2 people are under a lot of stress. After being given the intervention, there were 13 people who experienced mild stress, and 5 people who experienced moderate stress. This proves that Virtual Reality therapy is able to reduce the level of stress experienced by respondents.<sup>12</sup> Based on the results of the stress level of hypertension sufferers who were not given treatment but took antihypertensive medication, there were 10 people (50%) who experienced mild stress, 6 people (30%) experienced moderate stress, and 4 people (20%) experienced severe stress. This proves that there is a slight reduction in stress levels in hypertension sufferers without being given treatment or intervention but by taking antihypertensive drugs.<sup>13</sup>

From the results of the Wilcoxon Test, a significance value of  $0.000 < 0.05$  was obtained. Basis for Decision Making Wilcoxon Test. If the Asymp.Sig value  $< 0.05$ , then the hypothesis is accepted. If the Asymp.Sig value is  $> 0.05$ , then the hypothesis is rejected. Asymp.Sig (2-tailed) has a value of 0.000 because the value of 0.000 is smaller than 0.05 ( $0.000 < 0.05$ ) so it can be concluded that "Hypothesis is accepted" meaning there is a difference between the stress level results for the pre-test and post-test, so it can be concluded that "There is an Effect of Virtual Reality Therapy on the Stress Level of Hypertension Sufferers at Posbindu Buncis in the Working Area of the Kemiri Muka Community Health Center, Depok City in 2022"

The results of the Mann Whitney test show that the basis for decision making is if the value of Asymp.Sig.  $< 0.05$  then the hypothesis is accepted. If the value of Asymp.Sig.  $> 0.05$  then the hypothesis is rejected. Asymp.Sig.(2-tailed) value is  $0.002 < 0.05$ . So it can be concluded that "The hypothesis is accepted". Thus, it can be said that there is a difference in the stress level of hypertension sufferers between the intervention group (virtual reality therapy) and the control group (antihypertensive medication). Because there is a significant difference, it can be said that "There is an Influence of Virtual Reality Therapy on the Stress Level of Hypertension Sufferers at Posbindu Buncis in the Working Area of the Kemiri Muka Community Health Center, Depok City in 2022"

Previous research says stress can trigger hypertension through activation of the sympathetic nervous system which results in intermittent increases in blood pressure.<sup>14</sup> When a person experiences stress, the hormone adrenaline will be released and will then increase blood pressure through contraction of the arteries (vasoconstriction) and an increase in heart rate.<sup>15</sup>

One way to manage stress in hypertensive sufferers is virtual reality therapy, where this therapy can inhibit stress stimuli when receiving excessive sensory input, thus causing inhibition of stress impulses to the brain.<sup>16</sup> The virtual reality approach can be considered as additional psychological management and has been successfully used in treatment of acute and chronic pain. This technique is believed to be successful and useful in managing pain, stress and anxiety. Virtual reality therapy has no side effects and virtual reality therapy can help patients reduce analgesic dependence.<sup>16</sup>

## Conclusion

Based on the results of research that researchers have conducted regarding the effect of Virtual Reality therapy on stress levels in hypertension sufferers at Posbindu Buncis, Kemiri

Muka Health Center Working Area, Depok City in 2022, it can be concluded that there is an influence of Virtual Reality Therapy on Stress Levels in Hypertension Sufferers at Posbindu Buncis. Kemiri Muka Community Health Center Working Area, Depok City in 2022 with the statistical data results of the Wilcoxon Asymp.Sig Test (2-tailed) with a value of 0.000 because the value of 0.000 is less than 0.05 ( $0.000 < 0.05$ ), it is concluded that  $H_a$  is accepted.  $H_0$  is rejected.

### Conflict of Interest

This research is not involved in any conflict of interest.

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