

## ORIGINAL ARTICLE

# The Effect of Combination of Classical Music Therapy and Breathing Exercise Towards the Stress and Cortisol Level in Hemodialysis Patients in Dr. Mm. Dunda Regional Public Hospital in Limboto Gorontalo Regency

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### ABSTRACT

**Introduction:** Hemodialysis patients may experience various problems, such as physical and psychological complications. The most frequently occurring psychological complication is stress. Stress in patients with hemodialysis can increase the cortisol level in the blood. Therefore, this study is aimed at analyzing the effects of classical music therapy and breathing exercises on the stress level and the cortisol level in the hemodialysis patients. **Methods:** This true experiment study was conducted using pretest-posttest control group design. The samples involved patients with hemodialysis totaling 40 respondents comprising of 20 people in the control group and 20 people in the treatment group chosen by using random allocation sampling method. The treatment group was given an intervention of combining classical music therapy and breathing exercises done twice a week for 30 minutes according to the respondents' hemodialysis schedule. On the other hand, the control group received the standard intervention. While the stress level was measured using PSS (Perceived Stress Scale), the measurement of the cortisol level was done through laboratory examination using ELISA method (Enzym Linked Immunosorbent Assay). Moreover, the data were analyzed using independent t-test and Ancova test with the significance level of  $p < 0.05$ . **Results:** There were differences in the stress level ( $p=0.000$ ) and the cortisol level ( $p=0.000$ ) between the two groups. **Conclusion:** Based on the results, this study concludes that the combination of classical music therapy and breathing exercises is an innovative intervention which can decrease the stress level and the cortisol level in the hemodialysis patients.

**Keywords:** Hemodialysis, Classical musik therapy, Breathing exercises, Stress level, Cortisol

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The most often psychological complications found in hemodialysis patients are depression, anxiety, suicidal behavior, while the most common one is stress (1).

### INTRODUCTION

Hemodialysis patient may suffer various problems caused by malfunctioning of kidney. This state occurs every time until one's end of life. Physical stressors such as nausea, vomiting, pain, muscle fatigue, edema are some of the clinical manifestations of patients undergoing hemodialysis. The psychological complications of hemodialysis will also have a very complex impact that can affect physical, social, and spiritual health.

Stress experienced by hemodialysis patients causes an increase in cortisol in the blood, which can inhibit the formation of antibody and reduce the formation of white blood cell. Complementary therapy is one of the independent nursing actions that nurses can do to deal with stress and anxiety in patients by teaching relaxation and distraction techniques. One of the distraction techniques used to deal with stress and anxiety is classical music. Nursing intervention for providing classical music to reduce stress level have been studied, including research conducted by Cheung, Yee, Chan,

Saravelos (2). regarding the impact of music therapy on pain and stress reduction during oocyte retrieval to 70 patients as intervention group and they were treated by listening to music using headphones for 30 minutes and it eventually experienced a reduction in pain and stress levels. Instead of providing classical music therapy for anxiety, stress, and depression in patients undergoing hemodialysis, another nursing intervention innovation in the form of breathing exercises can be applied too.

Several innovative interventions in research have been conducted to reduce anxiety, stress, and cortisol levels. However, there has never been a study that combines classical music therapy and breathing exercises to reduce stress level and cortisol level in RSUD (Regional Public Hospital) Dr. M.M. Dunda Limboto. So the researchers are interested in doing a combination of classical music and breathing exercises to notice the stress level and cortisol level in hemodialysis patients at RSUD Dr. M.M. Dunda Limboto

**MATERIALS AND METHODS**

The research was quantitative study using a true experimental study design with a pretest-posttest control group design approach. Research samples were 40 respondents divided into 20 respondents in treatment group and 20 respondents in control group. The samples were retrieved by applying simple random sampling with random allocation sampling. Meanwhile, the research population was hemodialysis patients in the hemodialysis ward at RSUD Dr. MM. Dunda Limboto Gorontalo District that met the inclusion criteria.

Respondents in the treatment group were given a combination of intervention of classical music therapy and breathing exercises 2 times a week for 4 weeks with a duration of therapy for 30 minutes, while respondents in the control group were given intervention according to the standard of the hemodialysis ward. The respondent’s stress level was measured by using Perceived Stress Scale (PSS) questionnaire, and their cortisol level was measured by using laboratory tests using the ELISA (Enzyme-Linked Immunosorbent Assay) method.

The data analysis used Independent T-test to analyze the differences between the treatment and control groups, and ANCOVA (Analysis of Covariance) test was applied to assess the effect of confounding variables on the results of the study with a significant value of  $p < 0.05$ . Prior to data analysis, a normality test was performed using the Shapiro-Wilk test of normality.

**RESULTS**

**A. Characteristics of Subjects**

Table I shows that in the intervention group most of the respondents (55%) were 45-54 years old (early elderly), while in the control group almost half (45%) of

the respondents were aged (55-64) years (late elderly). Based on gender, it shows that the intervention group is half (50%) male and half (50%) female, while the control group of 20 respondents is mostly (65%) male. The education level of the respondents shows that in the intervention group most of the respondents have a high school education level (35%) and a university (35%), while in the control group almost half (40%) have a high school education level. Based on the respondent’s occupation, it shows that in the intervention group almost half (35%) of the respondents have a job as PNS / TNI / POLRI. Meanwhile, in the control group, almost half (35%) of respondents have other job.

**Table I : Distribution of respondents’ characteristics at Dr. MM. Dunda Regional Public Hospital in Limboto Regency**

Characteristics	Treatment Group		Control Group	
	Total	Percentage (%)	Total	Percentage (%)
<b>1. Age</b>				
a. 35 – 44 Years	4	20	5	25
b. 45 – 54 Years	11	55	6	30
c. 55 – 64 Years	5	25	9	45
<b>2. Sex</b>				
a. Male	10	50	13	65
b. Female	10	50	7	35
<b>3. Level of Education</b>				
a. Elementary School/Junior High School	6	30	5	25
b. Senior High School	7	35	8	40
c. University	7	35	7	35
<b>4. Job</b>				
a. PNS/TNI/POLRI	7	35	5	25
b. Private Sector Employee	2	10	2	10
c. Entrepreneur	6	30	7	35
d. Other	5	25	6	30

Source: Primary data, 2020

\*PNS stands for *Pegawai Negeri Sipil* or Civil Servant

\*TNI stands for *Tentara Nasional Indonesia* or Indonesian Military

\*POLRI stands for *Kepolisian Republik Indonesia* or Indonesian National Police

**B. Research Finding**

1. Identification of stress level and cortisol level before application of combination of classical music therapy and breathing exercises in hemodialysis patient.

a. Stress Level

The results of the stress level showed that before (pre-test) the combination of classical music therapy and breathing exercises in the treatment group, nearly all of them (70%) experienced moderate stress with a mean of 24.20, while in the control group, half of them (50%) experienced moderate stress with a mean of 20.30. Based on Independent T-test the  $p$  value  $< 0.05$  or 0.036 which indicated presence of

difference on value of treatment group and control group before being given the intervention of a combination of classical music therapy and breathing exercises, so that the stress level after (post test) treatment could not be tested, yet the decrease or difference between before and after was assessed.

b. Cortisol Level

The results of the cortisol level showed that before (pre-test) the combination of classical music therapy and breathing exercises in the treatment group, nearly all of them (95%), whereas the control group found more than half (70%) also had high cortisol level. Based on Independent T-test, the p value <0.05 or 0.007 which meant that there was a difference in value of cortisol level in the treatment group and the control group before being given the combination of classical music therapy intervention and breathing exercises, so that the cortisol level after (post test) could not be tested, yet the decrease or difference between before and after was assessed.

2. Identification of stress level and cortisol level after application of combination of classical music therapy and breathing exercises in hemodialysis patient.

a. Stress Level

The results of the analysis of Table II showed that the stress level after (post test) the combination of classical music therapy and breathing exercises in the treatment group decreased by 10.60, mean of stress level before was 24.20 (moderate stress) and after was 13.60 (mild stress) with a difference of standard deviation for 3,424. Meanwhile, the control group experienced an increase of 1.20, mean of stress level before was 20.30 (moderate stress), and after was 21.50 (moderate stress) with a difference of standard deviation for 5,367. The positive number in table 1.6 depicted a decrease, while the negative or minus number depicted an increase.

b. Cortisol Level

The result of Table III analysis showed that after (post test) the combination of classical music therapy and breathing exercises in the treatment group, the cortisol level decreased by 144.03, mean of cortisol level before was 290.78 and after was 146.75 with a

**Table II : Distribution of respondent's stress level after application of combination of classical music therapy and breathing exercises in hemodialysis patient at Dr. MM. Dunda Regional Public Hospital in Limboto Regency (post-test)**

Stress Level	Mean	Min-max	SD
<b>Treatment Group</b>			
Before <i>pre test</i>	24.20	14-33	4.786
After <i>post test</i>	13.60	6-25	4.871
Difference	10.60	5-16	3.424
<b>Control Group</b>			
Before <i>pre test</i>	20.30	10-30	6.433
After <i>post test</i>	21.50	10-3	6.755
Difference	-1.20	-10-8	5.367

Source: Primary Data, 2020

difference of standard deviation for 101.195, while the control group experienced an increase of 21.42, mean of cortisol level before was 207.67 and after was 229.09 with a difference of standard deviation for 108,738. The positive number in table III depicted a decrease, while the negative or minus number depicted an increase.

**Table III : Distribution of respondent's cortisol level after application of combination of classical music therapy and breathing exercise in hemodialysis patient at Dr. MM. Dunda Regional Public Hospital in Limboto Regency (post-test)**

Cortisol Level	Mean	Min-Max	SD
<b>Treatment Group</b>			
Before <i>pre test</i>	290.78	115.02 - 541.42	105.856
After <i>post test</i>	146.75	71.62 - 252.82	58.179
Difference	144.03	-58.60 - 346.20	101.195
<b>Control Group</b>			
Before <i>pre test</i>	207.67	99.02 - 352.62	75.802
After <i>post test</i>	229.09	82.02 - 327.42	71.020
Difference	-21.42	-197.00 - 200.60	108.738

Source: Primary Data, 2020

3. Analysis of effect of combination of classical music therapy and breathing exercises on stress level and cortisol level in hemodialysis patient.

a. Stress Level

Based on the results of Univariate Test of Analysis of Covariance (Ancova) in Table IV, it showed the stress level with p value = 0.00 and R. Squared value of 0.755, which meant that the combination of classical music therapy and breathing exercises had an effect on reducing stress level with a percentage of 75.5%, whereas the rest 24.5% was affected by other factors. Age variable as confounding variable obtained p value = 0.657>0.05, sex variable as confounding variable obtained p value = 0.260>0.05, and education level variable as confounding variable obtained p value = 0.167> 0.05.

**Table IV : Univariate Test of Analysis of Covariance (Ancova) for the effect of combination of classical music therapy and breathing exercise on the stress level of hemodialysis patient at Dr. MM. Dunda Regional Public Hospital in Limboto Regency**

Stress Level	Mean	p
Ancova		
Age	3.948	0.657
Group	1141.014	0.000
Sex	17.015	0.360
Education	37.596	0.167
<b>R Squared = 0.755</b>		

Source: Primary Data, 2020

b. Cortisol Level

Table V showed that the cortisol level obtained p value = 0.00 and R.Squared value was 0.659, which indicated that the combination of classical music

**Table V : Univariate Test of Analysis of Covariance (Ancova) for the effect of combination of classical music therapy and breathing exercises on the cortisol level of hemodialysis patient at Dr. MM. Dunda Regional Public Hospital in Limboto Regency**

Cortisol Level	Mean	p Ancova
Age	2763.181	0.579
Group	226015.441	0.000
Sex	1689.846	0.664
Education Level	26566.676	0.065
<b>R Squared = 0.659</b>		

Source: Primary Data, 2020

therapy and breathing exercises affected the reduction of cortisol level for 65.9% while the rest 534.1% was affected by other factors. Age variable as confounding variable obtained p value = 0.579>0.05, sex variable as confounding variable obtained p value = 0.664>0.05, and education level as confounding variable obtained p value = 0.065> 0.05.

**DISCUSSION**

**A. Identification of Stress Level and Cortisol Level before Application of Combination of Classical Music Therapy and Breathing Exercises in Hemodialysis Patient.**

The stress level before application of combination of classical music therapy and breathing exercises in the treatment and control groups showed results of p value on t-test of 0.036 <0.05, which meant that there was a significant difference in stress level scores between the intervention group and the control group. For the cortisol level, the p value of t-test was 0.007<0.05, which meant that there was a significant difference in cortisol level between the treatment and control groups.

Cortisol was also known as a stress hormone because its formation could be triggered by stress, both emotional stress and biological stress (Guyton & Hall, 2012). In the time of stress, the body produced more hormone cortisol as a form of compensation. This opinion implied that the value of cortisol level would rise when individual experiencing stress and vice versa. This study also found moderate stress level with cortisol level above normal values.

**B. Identification of Stress Level and Cortisol Level after Application of Combination of Classical Music Therapy and Breathing Exercises in Hemodialysis Patient.**

Table II showed that the treatment group experienced a decrease in average stress level by 10.6 points, with half of the respondents (50%) experiencing mild stress and half others (50%) experiencing moderate stress. Thus, there was a decrease in stress level from before the combination of classical music therapy and

breathing exercises with an average value of 24.20 (moderate stress) after dropping 10.6 points to 13.6 (mild stress). In the control group, there was an increase in average stress level of 1.20 with the majority (55%) of respondents experiencing moderate stress, where before the standard intervention, the initial average value of 20.30 (moderate stress) and experienced an increase after the intervention for 1.20 to an average of 21.5 (moderate stress).

Table III, it could be seen that the vast majority of respondent in the treatment group (60%) had normal cortisol level with an average decrease of 144.03. In detail, the initial data before the application of a combination of classical music therapy and breathing exercises obtained average value of cortisol level for 290.78 ng/ml (high), and there was a decrease in the average value of 144.03 points so that it became an average of 146.75 ng/ml (normal). Meanwhile, the control group found most of the respondents (80%) had high cortisol level with an average increase of 21.42, from the initial data before standard intervention which obtained average value of cortisol level for 207.67 ng/ml (high) and after application of standard intervention increased by an average of 21.42 points to an average of 229.09 ng/ml (high).

Guyton & Hall (3) stated that the formation of the cortisol hormone could be triggered by stress, both emotional stress, and biological stress. In the time of stress, the body produced cortisol hormone more as a form of compensation. The study also revealed a decrease in cortisol level that was directly proportional to a decrease in stress level. In addition, a theory by Smeltzer and Bare in 2013 expressed that deep breath relaxation techniques could provide a feeling of calm and comfort and could reduce tension throughout the body.

**C. Analysis of Effect of Combination of Classical Music Therapy and Breathing Exercises on Stress Level and Cortisol Level in Hemodialysis Patient.**

The analysis of effect of a combination of music therapy and breathing exercises on stress level and cortisol level in hemodialysis patients could be noticed in the mean value of both stress level and cortisol level before and after application of combination of music therapy and breathing exercises in the treatment group. The results of Univariate test of Analysis of Covariance (Ancova) for the effect of a combination of classical music therapy and breathing exercises on the stress level of hemodialysis patient at RSUD Dr. MM. Dunda Limboto in Table IV showed that the p value = 0.00 and the R.Squared value was 0.755, which meant that the combination of classical music therapy and breathing exercises had an effect on reducing stress level with a percentage of 75.5% where as the rest 24.5% was influenced by other factors. Several confounding variables showed that; age variable

obtained p value = 0.657>0.05, sex variable obtained p value = 0.360>0.05, and education level variable obtained p value = 0.167>0.05. While the results of Univariate Test of Analysis of Covariance (Ancova) for the effect of a combination of classical music therapy and breathing exercises on the cortisol level of hemodialysis patient in Table V showed that the p value = 0.00 and the R.Squared value was 0.659, which meant that the combination of classical music therapy and breathing exercises had an effect on reducing cortisol level with a percentage of 65.9% whereas the rest 34.1% was influenced by other factors. Several confounding variables showed that; age variable obtained p value = 0.579>0.05, sex variable obtained p value = 0.664>0.05, and education level variable obtained p value = 0.065>0.05. The results of this study indicated that the factors of age, sex and education level as confounding variables, which were expected to affect the results of the study were not achieved due to the p value was higher than 0.05.

The stress level obtained p value for 0,000 that was lower than 0,05, so that it was stated as having significant effect for application of combination of classical music therapy and breathing exercises on the stress level. Meanwhile, the cortisol level in table obtained p value for 0,000 that was lower than 0,05,so that it was stated to having significant effect for application of combination of classical music therapy and breathing exercises on the cortisol level.

A research conducted by Salehi B (4) in Iran showed the presence of influence on the reduction of patient's anxiety scale that undergone hemodialysis after having musical intervention, which was measured by the Spielberger State-Trait Anxiety Inventory test. In addition, the researcher assumed thatmusical therapy could help patients to be relaxed and calm so that it reduced the anxiety scale. Research conducted by Heo, Kim, Park, and Kil in 2016 (5) on the effect of simulated laughter programs on cortisol levelon hemodialysis patients showed that the mean value of the intervention group before therapy had a mean value of 8.03 and the control group was 9.03. After the intervention was carried out, there was a decrease in cortisol level in the treatment group which could be noticed the mean value dropping to 7.01, while the control group experienced an increase in the mean value to 10.60.

Music therapy had a positive impact on overcoming anxiety and stress because it could activate cells in the client's limbic system and autonomic nervous system. It was a harmonic air vibration that was captured by the auditory organs through the nerves in the body, which were then conveyed to the central nervous system (6).

## CONCLUSION

The following were conclusions drawn based on research finding on the effect of combination of classical music therapy and breathing exercises on the stress level and cortisol level in hemodialysis patients at RSUD Dr. MM. Dunda Limboto:

1. Before receiving combination of classical music therapy and breathing exercise, the hemodialysis patient experienced moderate level of stress with cortisol level above normal value.
2. After receiving combination of classical music therapy and breathing exercise, the hemodialysis patient experienced reduction in the stress level from moderate to mild and reduction in cortisol level to normal value.
3. The research finding indicated influence of combination of classical music therapy and breathing exercise on the stress level and cortisol level in hemodialysis patient at RSUD Dr. M.M. Dunda Limboto.

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