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Research Article

Effect of Stress Ball on Stress and Anxiety in Hemodialysis Patients

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Abstract

Introduction: Chronic kidney disease patients undergoing hemodialysis therapy experience various physical and mental problems that contribute to psychological disorders such as stress and anxiety. It can affect the mental and physical components of poor quality of life. A stress ball is one of the therapies that is considered the cheapest and easiest to use for dealing with stress and anxiety.
Purpose: To determine the effect of Stress Ball on Stress and Anxiety in hemodialysis patients.
Methods: The research design is a quasi-experimental one-group pre and post-test. The research sample was 34 hemodialysis patients members of Komunitas Pasien Cuci Darah Indonesia Jawa Barat (KCPDI West Java) with consecutive sampling techniques. Bivariate analysis using paired t-test. Respondents were asked to squeeze a stress ball for approximately 20-30 minutes in eight successive dialysis sessions. The instruments used are the Distress thermometer (DT) and Beck Anxiety Inventory (BAI).
Results: Stress ball intervention affects stress and anxiety levels in HD patients with each P-value of 0.000. The average difference between pre-test and post-test stress levels is 1.55 with the at-count value of 6.95 > t-table 2.03. At the same time, the difference between the average pre-test and post-test anxiety levels is 5.74 with an at-count value of 6.25> t-table 2.03. Conclusion: Stress ball has been proven to reduce stress and anxiety levels in hemodialysis patients.
Suggestion: Stress balls can be non-pharmacological therapy to reduce stress and anxiety problems for hemodialysis patients.

Keywords:
Stress_ball, stress, anxiety, hemodialysis

INTRODUCTION

In Indonesia, chronic kidney disease has reached its final stage or End-Stage Renal Disease (ESRD), requiring kidney replacement therapy, one of which is hemodialysis therapy. According to the World Health Organization (2018), the prevalence of chronic kidney disease is globally about 1 in 10 of the world's population of chronic diseases. Based on data from the 2018 Indonesian Renal Registry, patients undergoing hemodialysis in Indonesia have new patients with 66,433 people and active patients with a total of 132,142 patients. Where the province of West Java is one of the provinces that has the highest number of patients with hemodialysis with a total of 14,771 people for new patients and 33,828 active patients(1).

Hemodialysis (HD) is a lifelong treatment that significantly affects patients

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physically and mentally(2). HD patients experience many physical and mental stresses such as receiving a life-threatening diagnosis, dependent life on devices, painful fistula cannulation while on dialysis, need for lifelong medication and integrating meditation into their life, anxiety, depression, social life restrictions, fear of losing freedom and despair (3). All of these conditions contribute to psychological distress and distress. During the present COVID-19 pandemic, worry and dread grow, leading to a rise in psychological problems in HD patients and an increase in the severity of their mental illnesses. (4). The reason is none other than the fear of contracting the COVID-19 virus. For hemodialysis patients with comorbidities, the risk of death from being infected with COVID-19 increases.

Damanik's research (2020) showed that from 31 hemodialysis patients, eight respondents (25.8%), moderate anxiety (61.3%), and four respondents (12.9%) (5). The causes of anxiety in hemodialysis patients are due to various stressors, namely the experience of pain in the stabbing area when starting hemodialysis, financial problems, difficulty keeping a job, lost sex drive, depression due to chronic illness, and fear of death(6). According to a survey conducted by Jangkup et al. (2015), chronic kidney failure patients undergoing hemodialysis said they were anxious about machines, blood-filled tubes, worried about being pricked with needles when starting hemodialysis, and related to expensive payments(7). In line with Musa's research (2017), Out of 218 HD patients, on average, they experienced severe anxiety (Mean = 8.2, SD = 4.7) and experienced stress with an average level of mild to moderate (Mean = 9.2, SD). = 4.6). If this stress and anxiety are left unchecked, it will affect the hemodialysis treatment process and decrease the patient's quality of life(8).

Various methods are currently used to control this problem. One way is by using a stress ball which is considered the cheapest and easiest to use to deal with stress. A stress ball or hand exercise ball is a plastic toy, usually no more than 7 cm in diameter, that can be squeezed by the hand and manipulated with the fingers to relieve stress and muscle tension or exercise the hand(9). The results showed that using a stress ball reduced anxiety and pain during invasive vein surgery. Another study also said that stress balls proved to have a significant effect (z = 2.738, p = 0.006) on reducing stress levels in hemodialysis patients but had no effect on vital signs and comfort levels (10).

Although there is still little scientific research that proves it, some stress ball manufacturers say that holding the ball can make a person feel more relieved. This occurs due to stimulation of the nerves in the hands that are directly connected to the brain. When a person grips a stress ball firmly then rereleases it, the blood vessels that were previously tense due to the influence of cortisol (the stress hormone) will loosen again. This will make the oxygen supply that was previously blocked due to poor blood circulation again fulfilled(11). Stress ball exercises are also recommended to treat patients with arteriovenous fistulas to strengthen blood flow and blood vessels (12). Therefore, researchers are interested in examining the effect of stress balls on stress and anxiety in hemodialysis patients.

METHODS

The type of research used is quasi-experimental with one group pre and post with a cross-sectional approach. The dependent variable is stress and anxiety, while the independent variable is a stress ball.

Population and Research Sample

This study's participants were patients who received hemodialysis at multiple hemodialysis clinics in Bandung. The patient is a Komunitas Pasien Cuci Darah Indonesia Jawa Barat (KCPDI Jawa Barat). The inclusion criteria were adults, three

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months of hemodialysis therapy, cognitive awareness, and smartphone use. Cognitive impairment and mental retardation were the exclusion criteria. The sample method employed sequential sampling. GPower Software Version 3.1.6 was used to compute the number of samples assuming t-test, = 0.05, effect size = 0.5, and power level = 0.80. Therefore, the total number of responders to be recruited is 34.

Data Collection Tool

Data collection tools used in this study are as follows:

1. Questionnaire used to collect data on respondent characteristics, including age, gender, occupation, and duration of hemodialysis treatment.
2. Stress is measured with a Distress thermometer (DT). On the thermometer scale, there are numbers 0 to 10. A score of 0 indicates that a person is not experiencing stress, while a score of 10 indicates that the stress level is experienced the highest. DT had the best sensitivity (0.81) and specificity (0.64). The results of the validity test obtained a value of r = 0.47 with a P-value of 0.01
3. Anxiety was measured by the Beck Anxiety Inventory (BAI) questionnaire. The total score is calculated from 21 questions. A total score of 0-7 is interpreted as minimal anxiety level; 8 – 15 as Mild; 16 – 25 as Medium, and; 26 – 63 as Severe. Internal reliability or consistency of BAI = (Cronbach = 0.92) reliability of retest (1 week) for BAI was 0.75. BAI validity correlated with anxiety measure (r = 0.25)(13).

Data Collection Procedure

The research begins with the researcher taking care of all the necessary permits; after obtaining the permission, the researcher will find research respondents. Researchers joined the West Java KCPDI Whatsapp Group. The researcher explained to the respondents the purpose and benefits of the study and asked their willingness to be a respondent when the client was asked to agree to the agreement and join the research Whatsapp (WA) group. Respondents were asked to fill out a pre-test questionnaire through the Google form link that the researcher provided. The Google form contains questionnaires on the characteristics of the respondents, DT and BAI. Respondents were given brochures and videos on how to squeeze a stress ball. Then the respondents were asked to press the stress ball according to the instructions in the booklet. Respondents had performed stress ball therapy for eight consecutive HD sessions before HD (15 minutes) and during HD (15 minutes). Monitoring is done by sending a video during the intervention. The researcher also did a WA message reminder. In the last HD session, a post-test was conducted by filling out a questionnaire via a Google form.

How to treat Stress Ball:

1. Place a stress ball in one hand (according to your comfort, preferably on the hand with arteriovenous fistulas before hemodialysis)
2. Start squeezing the ball within 2-3 seconds, then stretch your arms
3. Squeezing the ball is repeated for 15 minutes
4. Do this stress ball therapy for eight consecutive hemodialysis sessions before hemodialysis (15 minutes) and during hemodialysis (15 minutes)

Data Analysis

Utilizing version 24 of the IBM SPSS Statistics application for data analysis. The Kolmogorov-Smirnov Normality Test reveals that all variables are normally distributed. Bivariate analysis A bivariate test utilizing the paired t-test Number (n), percentage (%), and mean standard deviation (M SD) were used to evaluate descriptive statistics. A p-value less than 0.05 was considered statistically significant.

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RESULTS

Table 1.
Characteristics of Respondents

Variable	Total n (%)
Age (mean ± SD)	38.38 ± 11.114
Gender	
Male	17 (50%)
Female	17 (50%)
Education	
Junior School	6 (17.6%)
High School	22 (64.7%)
College	6 (17.6%)
Long time living HD (mean ± SD)	(3.41 ± 0.925)
Range	
<1 year	3 (8.8%)
1-<2 year	1 (2.9%)
2-<3 year	9 (26.5%)
≥3 year	21 (61.8%)

According to Table 1, the mean age is 38.38 (SD = 11,114). The number of males and females is equal, totaling 17 individuals. The majority of respondents (64.7%) graduated from high school or its equivalent and underwent hemodialysis, averaging 3.41 (SD = 0.925) years (mostly within the range of 3 years) (61.8 percent).

Table 2.
Frequency Distribution Based on Stress Level on Hemodialysis Before and After Stress Ball Intervention (N=34)

	Minimum	Maximum	Mean	St. Deviation
Stress Pre-tes	0	9	4.06	2.71
Stress Post-tes	0	8	2.50	2.58
Anxiety Pre-tes	0	45	11.55	8.99
Anxiety Post-tes	0	24	5.82	5.47

Based on table 2, the minimum DT score on the pre-test and post-test is the same, namely 0, while the maximum value for the pre-test is one point higher than the post-test, which is 9. The average DT score for the stress pre-test is 4.06±2.71 and has decreased to 2.50±2.58 at the post-test. The maximum anxiety score decreased after the intervention from 45 to 24. The average anxiety score in the pre-test was 11.55±8.99, decreased in the post-test, namely 5.82±5.47. Based on table 3, the minimum anxiety category increased after the stress ball intervention was carried out, namely from 12 (35.3%) respondents to 26 (76.5%) respondents. After stress ball intervention, the mild category decreased from 13 (38.2%) to 7 (20.6%). Likewise, the moderate category experienced a decrease after the intervention, namely from 9 (26.5%) respondents to 1 (2.9%) respondents. Based on table 4, it is known that.

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Table 3.
Frequency Distribution Based on Anxiety Category Before and After Stress Ball Intervention (N = 34)

Anxiety category	Pre-test		Post-test	
	F	%	F	%
Minimal	12	35.3	26	76.5
Mild	13	38.2	7	20.6
Moderate	9	26.5	1	2.9
Severe	0	0	0	0

Table 4.
Differences in Stress & Anxiety Levels Before and After the Stress Ball Intervention in Hemodialysis Patients (N = 34)

Variable	Mean	St. Deviation	95% Confidence Interval of the Difference	t	Correlations	df	P-value
Stress Pre test-post test	1.55	1.31	1.1-2.01	6.95	0.88	33	0.00
Anxiety Pre test-post test	5.74	5.35	3.86-7.60	6.25	0.836	33	0.00

Based on table 4, it is known that the average difference in stress reduction between the pre-test and post-test is 1.55±1.31. The difference between these is 1.1 to 2.01 (95% Confidence Interval of the Difference Lower and Upper), while the P-value is 0.00 < 0.05 with t value 6.95 > t table 2.03. There is an effect of stress ball intervention on stress levels in hemodialysis patients. The value of correlations between pre-test and post-test stress is 0.88, which means a significant positive correlation between measurements during pre-test and post-test. The average difference in anxiety reduction between the pre-test and post-test is 5.74 ± 5.35. These differences are between 3.86 to 7.60 (95% Confidence Interval of the Difference Lower and Upper) while the p-value is 0.00 0.00 < 0.05 with t value 6.25 > t table 2.03 then there is an effect of stress ball intervention on anxiety levels in hemodialysis patients. The value of correlations between pre-test and post-test anxiety levels is 0.836, which means a significant positive correlation between measurements during pre-test and post-test. The conclusion is that stress ball intervention reduces stress and anxiety levels in hemodialysis patients.

DISCUSSION

With P-values of 0.000, the results of this study indicate that stress ball intervention reduces stress and anxiety levels in hemodialysis patients. In accordance with Kasar's (2020) research, stress balls significantly reduced the stress levels of experimental group hemodialysis patients with a P-value of 0.002. In the medical literature, the stress ball is typically described as a distraction technique for managing various symptoms during minimally invasive procedures or their effect on acute stress levels(9). Based on previous research, stress ball therapy has an effect on reducing anxiety in pre sectio caesarea patients with a P value of 0.000.

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Squeezing to deliver the hand will stimulate a sense of calm not only to the brain throughout the body but besides squeezing the stress ball can also to help the respondent's feelings of anxiety become calm (14). Holding a stress ball has been found to reduce pain and anxiety in patients undergoing conscious surgery. Furthermore, squeezing the stress ball before surgery might increase feelings of empowerment. Patients have it directly on the object, positively affecting anxiety and satisfaction without interfering with the surgical procedure (15). Individuals suffering from chronic illness face significant stress due to the disease and the lengthy treatment process. It is substantial for this group of patients to use stress reduction therapy. This study hypothesized that squeezing a stress ball might positively impact stress levels due to participant distraction during the process(15).

Stress balls can be a helpful tool for stress relief because they relieve the physical experience of intense emotions. Stress is not only an emotional and mental reaction but also a physical experience. When stress builds up in the body, it needs a way to release it, not perpetuating emotional and mental conditions. The stress ball provides a stress release point. They help calm the nervous system and aid processing. More often than not, he adds, the physical release created by stress balls can reduce the physical sensation of stress and other strong emotions. In contrast to the Yanes (2018) study, holding hands and squeezing stress balls during skin cancer excision surgery did not reduce anxiety in patients. However, many patients report anecdotally that using stress balls has a calming effect. Based on this reasoning, stress balls can still be used to reduce anxiety in patients who are extremely anxious before a procedure or who prefer human touch. It can be combined with music therapy or while holding hands with the closest family members in order to increase its effectiveness(16).

When you apply pressure to a stress ball, the nerves and muscles will stimulate and contract, making them stronger. The effect will improve nervous system function and reduce hormones that control stress levels. Squeezing the stress ball activates the hand and wrist muscles, then releasing the grip allows those muscles to relax. The repetitive gripping and releasing pattern helps relieve tension and stress. Grasping the stress ball firmly and rereleasing it also works like acupressure. Stimulation of pressure at specific points on the palms releases endorphins that fight cortisol in the body In addition, blood vessels that were previously tense due to the influence of cortisol (stress hormone) will loosen again. This will make the oxygen supply that was previously blocked due to poor blood circulation again fulfilled(17).

Numerous medical professionals recommend using a stress ball to enhance blood circulation. According to studies, squeezing a ball can raise the heart rate and oxygen levels in the brain. As a result, the heart will pump harder and blood circulation will be improved. The more efficient the circulation, the lower the risk of stroke, heart attack, and hypertension. In addition to preventing the development of hypertension and potential heart disease, stress balls also aid in preventing the formation of stress balls(15). Another benefit of squeezing a stress ball in hemodialysis patients undergoing Arteriovenous Fistula surgery is significantly increasing tip pinch and lateral pinch strength. Squeezing hands with a stress ball increases finger strength, especially the thumb and index finger. However, it cannot increase the palmar pinch and handgrip(18)(19).

While stress balls may assist with anxiety, tension, and blood circulation, it is essential to remember that the effects are transient. There are several more factors to consider to achieve the proper balance and enhance your overall health. Possessing and utilizing a stress ball will not prevent

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illnesses, diseases, or stress, but it will help to alleviate them. It is one of the most effective mindfulness solutions available for assisting folks in coping with their disease(14).

CONCLUSION

The stress ball intervention affects reducing stress and anxiety levels in hemodialysis patients. In addition, based on other research, stress balls have many benefits, one of which is blood circulation. This stress ball is easy and inexpensive to be a recommendation as a nursing intervention. Suggestions for further research are that periodically analyzing stress and anxiety levels is carried out. On what day of the intervention, the level of stress and anxiety decreases.

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