

The Effect of Progressive Muscle Relaxation with Self Instruction Training (SIT) Techniques in Video Media on The Sleep Quality of Hemodialysis Patients

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ABSTRACT

Introduction: Chronic kidney disease (CKD) is a global public health problem whose prevalence continues to increase every year. CKD is when the kidneys experience structural and functional disorders lasting over 3 months. Sleep disorders generally occur in people with chronic kidney disease, especially in people with end-stage kidney disease. Progressive muscle relaxation is one of the complementary therapies that can reduce anxiety, reduce pain, and lower muscle tension.

Objectives: The aims of this research is to analyze the effect of progressive muscle relaxation with self instruction training (SIT) Technique in Video Media on The Sleep Quality of Hemodialysis Patients.

Methods: The research design used was Pre-Eksperimental using a one-group pre-post test with a sample of 15 hemodialysis patients by purposive sampling.

Results: The results showed that the quality of sleep before progressive muscle relaxation was 11 respondents (73.3%) whose frequency of sleep quality was quite poor. After progressive muscle relaxation, 8 respondents (53.3%) had a fairly good frequency of sleep quality. The results of statistical tests using the Wilcoxon test showed there was a significant influence between progressive muscle relaxation on sleep quality in hemodialysis patients (p -value=0.002).

Conclusions: Progressive muscle relaxation plays a role in relaxing tense muscles and providing a sense of comfort and has an impact on improving sleep quality. Progressive muscle relaxation can be used as an alternative in improving sleep quality in hemodialysis patients.

Introduction

Chronic kidney disease (CKD) is a global public health issue whose prevalence continues to rise each year (Kovesdy, 2022). CKD is a condition where the kidneys experience structural and functional disturbances lasting more than 3 months (Mailani & Andriani, 2017). Chronic Kidney Disease is progressive and irreversible, meaning it cannot be recovered (Anggraini & Fadila, 2023; Rohmawati et al., 2022). The kidney function in patients with chronic kidney disease (CKD) has significantly declined, indicated by a Glomerular Filtration Rate (GFR) of <15 ml/min/1.73 m² (Putri et al., 2016). End-stage kidney failure that does not undergo kidney replacement therapy can lead to death (Mailani & Andriani, 2017).

Chronic Kidney Disease has become a global public health issue and ranked 18th in 2010 (*National Kidney Foundation*, 2023). Approximately 10% of the world's population is affected by GKK disease, with the total number of patients with GKK stages 1-5 currently estimated to reach



843.6 million (Kovesdy, 2022). The latest data according to the *Indonesia Renal Registry* (2018), shows that Indonesia has experienced an increase in patients undergoing hemodialysis each year, with a recorded number of new patients totaling 66,433 in 2018. East Java ranks second among 30 provinces in Indonesia, with approximately 14.4% of the population in Indonesia (Indonesia Renal Registry, 2018). The number of CKD patients in East Java in 2018 was 20,947 individuals (Kemenkes RI, 2018). The total number of CKD patients undergoing therapy in the Hemodialysis room at RSUD dr. Soeroto Ngawi is 66 people (RSUD dr. Soeroto, 2023). The number of hemodialysis patients at RSI At-Tin Husada is 170 people (RSUD At Tin Husada, 2023). Based on the results of the initial field study through interviews with 10 patients undergoing hemodialysis, 7 patients complained about being unable to sleep at night. The activities they engaged in included watching TV, looking at their phones, and simply lying down until morning. 3 patients reported being able to sleep from night until morning. In addition, 10 hemodialysis patients had never heard of progressive muscle relaxation before.

Patients with CKD suffer from a condition where the kidneys are unable to remove waste products from the blood and body cells, which are excreted in the form of urine (Salamah et al., 2022). This can lead to the accumulation of metabolic waste in the blood, particularly urea, resulting in various symptoms such as nocturia, weakness, nausea, loss of appetite, and weight loss, necessitating treatment with kidney replacement therapy or dialysis (Aditama et al., 2023). Dialysis is the primary treatment performed on CKD patients to sustain life. (Indrayana et al., 2018). Hemodialysis is a dialysis treatment used to remove metabolic waste from the body when the kidneys can no longer perform that function (Pratama et al., 2020). This activity continued throughout his life, thus affecting the physical and psychological condition of the CKD patient (Kemenkes, 2018). The most commonly reported clinical issues are itchy skin, muscle cramps, loss of appetite, swelling in the ankles and hands, chest pain, shortness of breath, erectile dysfunction in men, and sleep disturbances or insomnia (Aditama et al., 2023).

Sleep disturbances are commonly experienced by patients with chronic kidney disease, especially those with end-stage renal disease (ESRD) (Stephanie C Maung, Ammar El Sara, Cherylle Chapman, Danielle Cohen, 2008). Sleep disturbances affect 50 to 80% of hemodialysis patients due to increased cytokine levels. (Damayanti, 2021). Sleep disturbances in hemodialysis patients affect sleep quality in terms of the quantity or duration of sleep achieved (Nurhayati et al., 2021). Sleep quality refers to a person's satisfaction with their sleep, including aspects such as sleep depth, the ability to maintain sleep, and the ease of falling asleep without medical assistance (Safruddin, 2016). Poor sleep quality in patients with chronic kidney disease (CKD) undergoing hemodialysis can affect their daily activities and impact their physical, psychological, social, and spiritual well-being, potentially leading to a decline in sleep quality, such as cognitive and memory dysfunction, irritability, decreased alertness, concentration issues, and worsening conditions. (Cahya Ningrum et al., 2019). Non-pharmacological management of sleep disorders, particularly sleep management therapy, psychotherapy, and relaxation therapy. Relaxation therapy includes deep breathing relaxation, Benson relaxation, and progressive muscle relaxation (Nurani et al., 2019).

Progressive muscle relaxation is a relaxation therapy that involves tensing and relaxing the muscles in one part of the body at a time, with movements performed in sequence to create a physical sense of relaxation (Manurung & Adriani, 2017). Progressive muscle relaxation was



pioneered by Jacobson using systematic increases in voluntary muscle contraction and relaxation from distal to proximal (Florensia et al., 2022). Every time someone feels stressed and anxious, the body automatically reacts by releasing various hormones such as adrenaline, cortisol, and norepinephrine to prepare the body for physical activity (Mahdalena et al., 2015). Tense muscles over a long period can cause other symptoms in our body, such as headaches and tension or migraines (Suratih & Budi, 2022). Progressive muscle relaxation therapy can reduce anxiety, distract from pain, decrease muscle tension and stiffness, and improve sleep (Seyedi Chegeni et al., 2018). Progressive muscle relaxation therapy is one of the cheapest therapies because it does not require imagination, perseverance, or suggestion, has no side effects, and is easy to perform (Muhith et al., 2020). Progressive muscle relaxation is beneficial in increasing the production of melatonin and serotonin while reducing the stress hormone cortisol. Melatonin can induce the deep sleep that the body needs to promote natural healing in the form of growth hormone, while the effects of serotonin are related to mood, libido, sleep, memory, temperature regulation, and social characteristics (Alfiyanti et al., 2014). The aim of this research is to analyze the effect of progressive muscle relaxation therapy using self-instruction training (SIT) techniques through video media on the sleep quality of hemodialysis patients.

Methods

This research used a quasi-experimental with one group pre test-post test design. The population in this study consists of patients diagnosed with chronic kidney failure who are undergoing hemodialysis at Dr. Soeroto Ngawi General Hospital, totaling 66 patients, and at RSI At-Tin Husada, totaling 170 patients. The scope of this study consists of 15 samples, with inclusion criteria being: patients undergoing routine hemodialysis 2 times a week, cooperative patients who can communicate well, patients experiencing sleep disturbances, patients willing to undergo progressive muscle relaxation 4 times a week for 4 weeks, and willing to be respondents. Meanwhile, the exclusion criteria are: patients absent from the programmed activities, patients intolerant to progressive muscle relaxation activities (patients with severe acute or chronic pain, patients with unstable cardiovascular conditions, patients with severe psychological disorders), patients experiencing health issues during the intervention (example : pain, dizziness, weakness, anxiety, and muscle cramps), and patients receiving sleep medication therapy. Next, the researcher provides an explanation or information regarding the objectives of the research being researched by the researcher to the subject. Then the researcher gave an informed consent form to the respondent and asked the respondent to sign a statement of willingness to become a respondent. Next, respondents were asked to answer the questions on the questionnaire as honestly as possible and researchers checked the completeness of the respondent's identity and suitability. Then the researchers will teach progressive muscle relaxation movements in video form together in the hemodialysis room and provide examples of appropriate movements. Respondents carried out the intervention 4 times in 1 week and carried out for 4 weeks. In the second week, researchers asked respondents' willingness to accept the intervention provided. After 4 weeks, respondents filled out a sleep quality questionnaire after being given muscle relaxation therapy. The intervention was carried out at their respective homes, with family members asked to provide evidence of implementation in the form of videos. This video has been



created and modified by the research team from the progressive muscle relaxation video and has been subjected to expert and ethical testing. The measurement of sleep quality scores was conducted twice, both pre and post-intervention, using the Pittsburgh Sleep Quality Index. (PSQI). This research has passed the ethical review with the number: 053/E-KEPK/STIKES/BHM/V/2024

Results

Table 1. Respondent's characteristic (n=15)

Characteristics	Frequency	(%)
Gender		
- Man	7	46,7
- Woman	8	53,3
Age		
- Mature	5	33,3
- Elderly	10	66,7

Based on Table 1, the results show that the most common gender of respondents is Female, with a total of 8 respondents (53.3%). The most prevalent age group is the elderly, with a total of 10 respondents (66.7%).

Table 2. Frequency of Sleep Quality Before and After Progressive Muscle Relaxation Therapy (n = 15)

Variable	Pre-Muscle Relaxation (%)	Post Muscle Relaxation (%)
Sleep Quality		
- Pretty good	-	8 (53,3%)
- Pretty Bad	11 (73,3%)	6 (40%)
- Very bad	4 (26,7%)	6,7

Based on Table 2, it was found that before progressive muscle relaxation, 11 respondents (73.3%) had a frequency of sleep quality that was quite poor. After progressive muscle relaxation, 8 respondents (53.3%) had a frequency of sleep quality that was quite good.

Table 3. Distribution of Respondents Based on Sleep Quality Before and After Progressive Muscle Relaxation (n=15)

Variable	Mean	Std. Deviation	Min-Max	p-value
Pre-Test	1,73	0,458	1,00-1,00	0,002
Post-Test	2,47	0,640	2,00-3,00	

Based on table 3, it shows that the mean or average sleep quality before progressive muscle relaxation is 1.73, and after progressive muscle relaxation, it is 2.47. The results of the statistical



test using the Wilcoxon test showed a p-value of 0.002 (α : 0.05), allowing us to conclude that the alternative hypothesis (H_a) is accepted. The value ($p < 0.05$) indicates that there is an effect of sleep quality between the pre-test and post-test after progressive muscle relaxation was performed.

Discussion

Sleep Quality Before Muscle Relaxation

Based on the results above, it can be seen that the sleep quality before progressive muscle relaxation (pre-test) for most respondents is poor. In line with the research conducted by Sabry et al. (2010), it was found that 50-80% of patients undergoing hemodialysis experience sleep disturbances.. Patients undergoing hemodialysis have a rather poor quality of sleep, which may be caused by several factors, one of which is the physical and psychological stress experienced by hemodialysis patients. Several factors that can lead to sleep disturbances, such as demographic factors, lifestyle factors, psychological factors, biological factors, environmental factors, and dialysis therapy factors. Age also affects the quality of sleep in hemodialysis patients; most respondents in this study were elderly, and as age increases, they more frequently experience sleep disturbances. Age affects the quality of the REM sleep phase, as you get older you will experience shorter REM phases, wake up frequently, reduce delta waves and experience ineffective sleep (Peters et al., 2014).

Sleep Quality After Muscle Relaxation

The analysis of the respondents' sleep quality after muscle relaxation (post-test) showed an improvement in sleep quality from previously poor to moderate. In line with the research conducted by Doorley, et al. (2022); Sanad, et al. (2023), progressive muscle relaxation can improve sleep quality in hemodialysis patients. According to Rohmawati (2021), a way to maintain sleep quality through relaxation is muscle relaxation, which allows each muscle to become more relaxed, making it comfortable and easier to sleep. This can be done for someone who is experiencing insomnia, the onset of stress, symptoms of anxiety, and depression. Based on the results above, the researchers believe that muscle relaxation therapy can improve sleep quality in hemodialysis patients because muscle relaxation can reduce anxiety levels, alleviate pain, and relax tense muscles, allowing the body to feel more at ease and facilitating the process of falling asleep. This is supported by the research of Sari et al., (2020), which states that muscle relaxation can improve sleep quality and reduce fatigue in hemodialysis patients.

The Effect of Progressive Muscle Relaxation on the Sleep Quality of Hemodialysis Patients

Based on the statistical analysis results, there is a significant effect of progressive muscle relaxation therapy on the sleep quality of hemodialysis patients. This indicates that progressive muscle relaxation therapy has a positive impact on improving sleep quality in hemodialysis patients. According to Toussaint, et al. (2021), progressive muscle relaxation therapy can improve sleep quality due to the stimulation of the parasympathetic autonomic nervous system's raphe nuclei, leading to changes that can regulate autonomic nervous system activity, such as reduced oxygen function, breathing frequency, heart rate, muscle tension, blood pressure, and



alpha waves in the brain, making it easier to fall asleep. Beside that, PMR also reduces sympathetic nervous system activity, which is often elevated in individuals with sleep disturbances. By lowering hearth rate, blood pressure and respiratory rate, the cody transitions into a state conducive to sleep. The principle of progressive muscle relaxation involves gradually relaxing four major muscle groups, such as the arm muscles, neck muscles, chest muscles, and thigh muscles, which can make the body feel comfortable and relaxed, leading to a reduction in tension that can result in deeper sleep. The breathing technique performed consciously using the diaphragm in progressive muscle relaxation allows the abdomen to rise slowly and the chest to expand fully, providing beneficial massage to the heart as the diaphragm's movement can relieve blockages and enhance blood flow throughout the body. When the blood flow to the brain increases, this increase in blood flow will enhance the supply of nutrients and oxygen, and this condition will stimulate the brain to release serotonin throughout the body, making the body calm and facilitating sleep.

Conclusion

Based on the research results, it can be concluded that there is a significant influence between progressive muscle relaxation on sleep quality in hemodialysis patients. According to the study's findings, patients' sleep quality can be effectively improved by this intervention. While SIT helps control thoughts and emotions that might interfere with sleep, the PMR approach promotes physical relaxation. Patients find it simpler to do exercises on their own when they are delivered via video. All things considered, the combination of these two methods improves the quality of sleep for hemodialysis patients, who frequently have trouble sleeping because of their medical problems.

Ethics approval and consent to participate

This study received ethical approval from the Health Research Ethics Committee Stikes Bhakti Husada Mulia Madiun, with approval number 053/E-KEPK/STIKES/BHM/V/2024. All procedures performed in this study were in accordance with the ethical standards outlined.

All hemodialysis patients received comprehensive information about the study's goals, methods, advantages, and any dangers prior to their involvement. After being fully informed, each person who consented to participate in the study completed a written informed consent form. Participants were told that their participation in the study was completely optional and that their medical care would not be negatively impacted if they choose to leave at any point. Throughout the study, participants' personal information was kept completely private and confidential.

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References

- Aditama, N. Z., Kusumajaya, H., & Fitri, N. (2023). *Faktor-faktor yang berhubungan dengan kualitas hidup pasien gagal ginjal kronis*. 6, 109–120.
- Alfiyanti, N. E., Setyawan, D., & Kusuma, M. A. B. (2014). Pengaruh Relaksasi Otot Progresif Terhadap Tingkat Depresi pada Pasien Gagal Ginjal Kronik yang Menjalani Hemodialisis di Unit Hemodialisa RS Telogorejo Semarang. *Jurnal Ilmu Keperawatan Dan Kebidanan (JIKK)*, 8(2), 210–221.
- Anggraini, S., & Fadila, Z. (2023). *Kualitas hidup pasien gagal ginjal kronik dengan dialisis di asia tenggara : a systematic review*. 11(1), 77–84.
- Cahaya Ningrum, W., Imardiani, & Saidatur, R. (2019). Seminar dan Workshop Nasional Keperawatan “Implikasi Perawatan Paliatif pada Bidang Kesehatan.” *Seminar Workshop Nasional, 01*, 218–222.
- Damayanti, M. (2021). Fatigue Dan Kualitas Tidur Pada Pasien Hemodialisa : Literature Review Dan Kualitas Tidur Pada Pasien Hemodialisa. *Fatigue Dan Kualitas Tidur Pada Pasien Hemodialisa : Literature Review Dan Kualitas Tidur Pada Pasien Hemodialisa*.
- Doorley, J., Greenberg, J., Stauder, M., & Vranceanu, A. (2022). *The role of mindfulness and relaxation in improved sleep quality following a mind-body and activity program for chronic pain*. 12(11), 2672–2680. <https://doi.org/10.1007/s12671-021-01729-y>.The
- Florensia, V., Anggriani, & Agustin, L. (2022). Pengaruh Terapi Relaksasi Otot Progresif terhadap Kualitas Tidur Lansia di Desa Fajar Kecamatan Sorkam Kabupaten Tapanuli Tengah Tahun 2021. *Jurnal Kesehatan Dan ...*, 2(1), 7–12.
- Indonesia Renal Registry. (2018). 11th report Of Indonesian renal registry 2018. *Indonesian Renal Registry (IRR)*, 14–15.
- Indrayana, M., Armayani, A., & Rahmadania, W. O. (2018). Pengaruh Pursed Lip Breathing terhadap Fatigue Pasien GGK di Ruang Hemodialisa RSUD Bahteramas. *Jurnal Keperawatan*, 90–97. <https://doi.org/https://doi.org/10.36990/hijp.v10i2.82> Corresponding
- Kemendes. (2018). *Cegah dan kendalikan Penyakit Ginjal dengan Cerdik*.
- Kemendes RI. (2018). *HASIL UTAMA RISKESDAS 2018*.
- Kovesdy, C. P. (2022). Epidemiology of chronic kidney disease: an update 2022. *Kidney International Supplements*, 12(1), 7–11. <https://doi.org/10.1016/j.kisu.2021.11.003>
- Mahdalena, Muhlis, & Fadli, M. (2015). Efektifitas teknik relaksasi progresif terhadap berkurangnya keluhan gangguan tidur pada remaja di Panti Al-Mudakkir dan di Panti Al-Amin Banjarmasin. *Jurnal Keperawatan*, VI(1), hlm 23-27.
- Mailani, F., & Andriani, R. F. (2017). Hubungan Dukungan Keluarga Dengan Kepatuhan Diet Pada Pasien Gagal Ginjal Kronik Yang Menjalani Hemodialisis. *Jurnal Endurance*, 2(3), 416. <https://doi.org/10.22216/jen.v2i3.2379>
- Manurung, R., & Adriani, T. U. (2017). Pengaruh Terapi Relaksasi Otot Progresif Panti Jompo Yayasan Guna Budi Bakti Medan Tahun 2017. *Jurnal Ilmiah Keperawatan Imelda*, 3(2), 124–



136.

- Muhith, A., Herlambang, T., Fatmawati, A., Siwi Hety, D., & Surya Merta, I. W. (2020). *Pengaruh terapi relaksasi otot progresif terhadap kekuatan otot dan kualitas tidur lanjut usia*. 8487(2), 306–314.
- National Kidney Foundation. (2023). *Global Facts: About Kidney Disease*.
- Nurani, R. D., Rochmawati, E., & Nurchayati, N. (2019). Efektifitas terapi murottal Al Qur'an terhadap kualitas tidur pada pasien hemodialisa. *JHeS (Journal of Health Studies)*, 3(2), 78–85. <https://doi.org/10.31101/jhes.525>
- Nurhayati, I., Hamzah, A., Erlina, L., Rumahorbo, H., Keperawatan, J., & Kemenkes, P. (2021). Gambaran kualitas tidur pada pasien gagal ginjal kronik yang menjalani terapi hemodialisa : literature review. *Jurnal Keperawatan*, 1(1).
- Peters, K. R., Ray, L. B., Fogel, S., Smith, V., & Smith, C. T. (2014). *Age Differences in the Variability and Distribution of Sleep Spindle and Rapid Eye Movement Densities*. 9(3). <https://doi.org/10.1371/journal.pone.0091047>
- Pratama, A. S., Praghlapati, A., & Nurrohman, I. (2020). Mekanisme Koping pada Pasien Gagal Ginjal Kronik yang menjalani Hemodialisis di Unit Hemodialisa RSUD Bandung. *Jurnal Smart Keperawatan*, 7(1), 18. <https://doi.org/10.34310/jskp.v7i1.318>
- Putri, T. D., Mongan, A. E., & Memah, M. F. (2016). Gambaran kadar albumin serum pada pasien penyakit ginjal kronik stadium 5 non dialisis. *Jurnal E-Biomedik*, 4(1), 173–177. <https://doi.org/10.35790/ebm.4.1.2016.10861>
- Rohmawati, D. L. (2021). *Terapi Komplementer untuk Menurunkan Tekanan Darah (Evidence Based Practice)*. Media Sains Indonesia.
- Rohmawati, D. L., Fadhlita, N. K., & Hantoro, R. T. (2022). *Correlation of self-efficacy and self-management among patients undergoing hemodialysis with intradialytic hypertension complicaciones Correlación de autoeficacia y automanejo entre pacientes en hemodiálisis con complicaciones hipertensivas intradiálisis*. 130(Supl 5). <https://doi.org/10.47307/GMC.2022.130.s5.7>
- RSUD At Tin Husada. (2023). *Rekam Medis RS At Tin Husada Ngawi*.
- RSUD dr.Soeroto. (2023). *Rekam Medis RSUD dr. Soeroto Ngawi*.
- Safuruddin. (2016). Pengaruh latihan relaksasi otot progresif terhadap kualitas tidur klien gagal ginjal yang menjalani terapi hemodialisis. *Jurnal Keperawatan*, 9, 217–221.
- Salamah, N. A., Hasanah, U., & Dewi, N. R. (2022). *Penerapan pursed lips breathing terhadap fatigue pada pasien gagal ginjal kronik*. 2, 479–486.
- Sanad, H. S., Ebrahim, H., El, A., Mohammed, A. A., Hassan, S. S., Hanan, S., Scientific, M., Journal, N., Issn, P., Issn, O., & No, V. (2023). *Effect of Progressive Muscle Relaxation Technique on Sleep Quality among Hemodialysis Patients*. June.
- Sari, K., Wulansari, H., Laowa, E. S., Paulina, R., & Anggeria, E. (2020). Pengaruh teknik relaksasi otot progresif terhadap kualitas tidur dan kelelahan fisik pada lansia di Yayasan Guna Budi Bakti Medan. *Jurnal Keperawatan*, 2, 587–595. <https://doi.org/10.1097/00000446-190202000-00022>
- Seyedi Chegeni, P., Gholami, M., Azargoon, A., Hossein Pour, A. H., Birjandi, M., & Norollahi, H. (2018). The effect of progressive muscle relaxation on the management of fatigue and quality of sleep in patients with chronic obstructive pulmonary disease: A randomized



- controlled clinical trial. *Complementary Therapies in Clinical Practice*, 31, 64–70. <https://doi.org/10.1016/j.ctcp.2018.01.010>
- Stephanie C Maung, Ammar El Sara, Cherylle Chapman, Danielle Cohen, D. C. (2008). Sleep disorders in chronic kidney disease. *Primary Psychiatry*, 15(1), 57–63. <https://doi.org/10.5527/wjn.v5.i3.224>
- Suratih, K., & Budi, E. (2022). Benefits of Progressive Muscle Relaxation to Improve Sleep Quality in Youth. *Jurnal Smart Keperawatan*, 9(2), 131. <https://doi.org/10.34310/jskp.v9i2.683>
- Toussaint, L., Nguyen, Q. A., Roettger, C., Dixon, K., Offenb, M., Kohls, N., Hirsch, J., & Sirois, F. (2021). *Effectiveness of Progressive Muscle Relaxation, Deep Breathing, and Guided Imagery in Promoting Psychological and Physiological States of Relaxation. 2021.*

