

Effect of Progressive Muscle Relaxation Technique on Sleep Quality among Hemodialysis Patients

Hanan Salem Sanad¹; Hanan Ebrahim Abd El Aziz²; Amany Anter Mohammed³; Sabah Saleh Hassan⁴

1. Master degree in Psychiatric and Mental Health Nursing, Faculty of Nursing, Minia University
2. Professor of Psychiatric and Mental Health Nursing, Faculty of Nursing, Cairo University
3. Assistant professor of Psychiatric and Mental Health Nursing, Faculty of Nursing, Minia University
4. Assistant professor of Psychiatric and Mental Health Nursing, Faculty of Nursing, Minia University

Abstract

Background: Hemodialysis (HD) stands as the most commonly treatment approaches within the field of dialysis. Sleep disturbances are more common problem among HD patients and affect patients' clinical outcomes. Progressive muscle relaxation is a nursing intervention that can be administered to hemodialysis patients to reduce these problems. **Aim:** Evaluate the effect of progressive muscle relaxation technique on sleep quality among hemodialysis patients. **Research design:** The aim of this study was achieved through utilizing a quasi-experimental research design. **Sample:** 60 adult patients with chronic renal failure who were receiving hemodialysis at Minia University Hospital for Urology and Nephrology were chosen as a purposeful sample. **Tools:** The data collection process involved the utilization of two tools; Structured Interview Questionnaire Sheet and Pittsburg Sleeping Quality Index (PSQI). **Results:** The global PSQI's mean score reduced immediately and post implementing the training program. Statistical significant differences were detected between the total PSQI mean score and age, residence, marital status, occupation and family income at the pretest. While at the immediate and posttests, statistical significant differences were observed between the total PSQI mean score age, marital status and educational level. **Conclusion:** It was concluded that progressive muscle relaxation effectively enhances the quality of sleep among patients receiving hemodialysis. **Recommendation:** Booster sessions could be conducted on intermittent periods after the first intervention to boost the long term effect of the training program.

Keywords: *Progressive muscle relaxation, Sleep quality, Hemodialysis patients*

Introduction

Chronic Renal Failure (CRF) is a pathological state characterized by gradual and permanent deterioration of kidney function that results from a range of causal factors leading to the incapacity to effectively excrete metabolic waste and carry out normal renal processes. CRF is increasingly common in persons inflicted with chronic illnesses like hypertension and diabetes mellitus. In addition, the occurrence of typical risk factors for cardiovascular disease is significantly elevated in individuals with chronic kidney disease. Therefore, it is essential to identify these risk factors early and control them effectively in order to enhance outcomes (Malfasari et al., 2023).

In this respect, Al-Shaheen et al., (2023) highlighted that one of the strategies aimed at mitigating mortality risks among patients with CRF involves the adoption of hemodialysis (HD) as a treatment modality. HD is a therapeutic procedure designed to eliminate excess fluids and toxins from the body when the kidney is incapable of performing this function, leading to the patient's dependence on the treatment. On the other hand, the dialysis procedure causes physical and muscle function deterioration, mental health issues and poor quality of sleep.

Similarly, Purba et al., 2020 reported that one of the widely noticed complications that arises among HD patients is sleep disturbance with a prevalence rate of 80%. Long-term sleep problems refer to poor sleep quality, which can lead to medical and psychological issues in individuals experiencing HD. On the other hand, Karatas et al., (2018) reported other factors which can impact sleep quality like lifestyle choices, environmental conditions, professional and social obligations, financial circumstances, overall health status and stress levels.

According to Nelson et al., (2022) sleep quality can be recognized as the extent of contentment towards an individual's sleep experience that can be examined by considering various factors such as sleep onset, ability to maintain sleep, duration of sleep and the sense of refreshment upon awakening.

The reduction in the quality of sleep experienced by individuals affected by HD is a common occurrence that presents as a symptom and can significantly impede the patient's capacity for independent functioning. This phenomenon limits patient's ability to engage in routine daily activities, ultimately leading to detrimental influence on their overall quality of life. Although sleep problems are highly prevalent among HD patients, there is currently no definitive curative treatment available (Arslan & Akça, 2020). So, treating sleep disturbances in dialysis patients effectively may result in positive physiological and psychological effects. Currently, a standard medical protocol for addressing sleep issues in patients undergoing HD has not been established, opening the opportunity for complementary alternative medicine of sleep management (Elsayed et al., 2019).

Progressive muscle relaxation (PMR) is an important form of relaxation techniques that involves engaging in two distinct processes; intentional contraction and release of various muscles in the body, incorporating a combination of breathing exercises and motion-based activities (Ramasmay, et al., 2018). Due to its simplicity, affordability and cost-effectiveness, the strategy has consistently been acknowledged as one of the most effective complementary approaches. Persons can experience a gradual state of relaxation achieved through deliberate contraction and subsequent relaxation of targeted muscle groups when implementing PMR (Hayati, et al., 2020).

In this context, psychiatric nurses assume a critical role in the field of PMR as a means of rehabilitating HD patients in order to enhance various aspects of their lives including their quality of life, physical functioning, sleeping pattern and overall management. Through the application of a holistic or bio-psycho-social perspective, the nurses work towards empowering clients through promoting their independence and autonomy in daily living (Ayirathammal, 2020). Nurses' understanding regarding poor sleep quality in patients undergoing HD is an important factor for effective nursing care. Also, education regarding interventions is crucial for patients with sleep disorders (Muz et al., 2021). Ultimately, nurses should implement a psychoeducation intervention about sleep quality and PMR to increase the effect of the training program (Al-Nashri & Almutary, 2022).

Significance of the Study

Chronic renal failure (CRF) is an ongoing deterioration of kidney function that influences over 10% of the global population, equivalent to over 800 million individuals. CRF imposes a significant burden on nations with low or middle-incomes, which have limited resources to address its outcomes. Over the past two decades, a limited set of non-communicable illnesses has exhibited a rise in mortality rates. In this context, CRF has emerged as a foremost contributor to mortality in various populations, globally (Kovesdy, 2022). In Egypt, the latest estimate concerning the prevalence of dialysis was obtained in 2019 and indicates that the condition affects 0.61 per 1000 individuals, with an incidence rate of 0.19 per 1000 individuals (Farag & El-Sayed, 2022).

An Egyptian study conducted by Elsayed Rady et al., (2020) documented that (76.7%) of HD individuals suffered from low sleeping quality. Another study finding by Setyaningrum et al., (2022) indicated that the majority of HD patients were suffering from poor sleep quality. Several studies showed better function of PMR in improving the symptoms of sleep disorders in HD patients. Consequently, healthcare professionals can integrate these secure programs in their care plans (Puspitosari et al., 2022).

Indeed, PMR is an effective nursing intervention which can improve the sleeping quality for HD patients. Subsequently, the current research was performed to evaluate the effect of PMR technique on sleep quality among patients with CRF undergoing HD.

Aim of the Study

The current research aimed to evaluate the effect of progressive muscle relaxation technique on sleep quality among hemodialysis patients.

Subjects and Method:

Research hypothesis:

Hemodialysis patients who will practice progressive muscle relaxation technique will have good sleep quality.

Research design: -

Pre, immediate and post-test quasi-experimental research design was utilized to accomplish the aim of the present research.

Setting:

The Kidney Dialysis Unit at Minia University Hospital for Urology and Nephrology was selected to carry out the present study. Kidney Dialysis Unit consists of 6 rooms and 54 machines. The dialysis rooms located in three floors (two rooms /floor). It works 24 hours/day through 3 shifts (morning, afternoon and night). It serves Minia governorate

Sample: -

60 adult patients with CRF who were receiving HD were chosen as a purposeful sample. According to Minia University Hospital for Urology and Nephrology's registration office, a total of 170 patients afflicted with CRF received HD treatment throughout 2020. Accordingly, the size of sample was determined to be 60 patients based on a calculation considering a margin of error set at 5%, a confidence level of 95%, a population size of 170. The following calculation formula was utilized to determine the appropriate sample size (Taherdoost, 2017).

$$N = \frac{t^2 \times p(1-p)}{m^2}$$

Description:

N= required sample size

t = confidence level at 95 % (standard value of 1.960)

p= estimated prevalence of CRF patients receiving HD in Dialysis Unit at Minia University hospital for Nephrology and urology in 2020

m= margin of error at 5 % (standard value of 0.050)

Inclusion criteria:

- Patients diagnosed with chronic renal failure.
- Their ages were (18-65) years.
- Both genders.
- Conscious patients free from other chronic illness (uncontrolled heart diseases, pulmonary diseases).
- Capable of communicating and willingness to take part in the research.

Exclusion criteria:

- Patients with cognitive impairment and psychiatric disorders.
- Patients receiving pharmacological or non-pharmacological drugs for sleep

Study tools:

The required data were gathered using the subsequent tools: -

Tool I: Structured Interview Questionnaire:

The researcher developed this tool, which was comprised of 2 portions:

Part one: Socio-demographic Data Sheet:

It included data related to socio-demographic attributes of patients such as age, gender, residence, marital status, educational level, occupation and family income.

Part two: Medical Data Sheet:

It included data related to medical health condition such as history of disease, physical symptoms and the problems faced during the hemodialysis sessions.

Tool II: The Pittsburg Sleeping Quality Index (PSQI):

This scale had been originally constructed by **Buysee et al., (1989)** to assess the patient's sleeping quality and analyze numerous factors that can impact their sleep quality. The scale consisted of 19 self-rated items related to seven components as following: 1- subjective sleep quality, 2-sleep latency , 3- sleep duration, 4-sleep efficiency, 5- sleep disturbance, 6- use of sleep medication, and 7- daytime dysfunction.

The assessment was carried out using scoring system that ranged from 0 to 3 for each component (7 components). PSQI,s global score was 21 which was calculated by adding the seven component scores together. Score 0 represented very good, while a score 3 represented very bad. The PSQI total score displaying a value of ≤ 5 represented that the respondent had experienced good sleeping quality, while a score > 5 represented poor sleeping quality

Validity:

Five psychiatric mental health nursing specialists assessed the scales' validity. The researcher translated the scales' statements and then reviewed them by the five experts. Tools were reviewed for topic coverage, item sequencing, clearness, relevance, applicability, format and length. Minor changes have been done such as rephrasing of certain sentences based on the suggestions of experts

Reliability

Internal consistency of PSQI was calculated though Cronbach's alpha coefficients test which was 0.90 that means excellent reliability.

The training Program:

The training program had been executed by undertaking the subsequent phases:

1- Assessment phase:

The aim of this stage was to assess sleep quality among HD patients. Once offering a detailed explanation about the nature and purpose of the research, each participant was personally interviewed to gather the necessary data.

2- Preparatory phase:

The program's strategy, duration, teaching methods, sessions' number and appropriate media utilized were all part of the planning stage. The present study consisted of seven sessions, with two weekly sessions. Each session lasted anywhere between 60 - 90 minutes. A various teaching methods were used in this study as videos, pictures, brochure, lecture and discussion. The training program was carried out within about 10 months

3- Implementation phase.

The patients who participated in the research were being sorted into 10 subgroups after filling the tools of the study; each subgroup contained 6 participants.

The subsequent sessions would cover the training program:

Session 1: Introduction about the research (purpose, required time for sessions and content).

Session 2: Brief introduction about chronic renal failure and hemodialysis.

Session 3: Brief introduction about sleep quality.

Session 4: Practicing deep breathing exercise.

Patients were instructed to take deep breath, inhale deeply through the nose and to feel the abdomen rises as

filling their body with air. Then gently exhale out through the mouth, the navel pushing in toward the spine as the patient expels air out

Session 5: Brief introduction about progressive muscle relaxation technique.

Session 6: Practicing progressive muscle relaxation technique.

The researcher instructed the respondents regarding the practice of PMR for the purpose of inducing a relaxed state. In order to initiate the procedure, it was imperative that patients adopt a relaxed bodily posture and subsequently take a deep breath. Specifically, patients should begin by taking a deep inhalation through their nose followed by a slow exhalation through their mouth. Besides, the researcher instructed the participants to perform systematically muscular contraction and relaxation; beginning with muscles of feet, calves, thigh, abdomen, back, hands, biceps, forearms, shoulders, neck and face. The process of muscle contraction lasted approximately 5-10 seconds, followed by a relaxed state for another 5-10 seconds. Simultaneously, the individual ought to concentrate on the sensations perceived following the relaxation of the muscle. The researcher directed the patient's attention to distinguish between the sensations of muscular contraction and relaxation. The procedure of PMR is usually carried out for duration of 10 to 20 minutes.

Session 7: Revising and summarizing the previous sessions with the participants. After teaching patients the relaxation method, a training PMR compact disc (CD) as well as an educational pamphlet was given to them. They were been asked to do the practice at home twice a day for one month (once during the day and once at night before going to bed). The researcher emphasized that the patients should practice the technique on a daily basis, which is regarded a vital aspect of the program's implementation. Besides, the researcher's phone number was given to the patients to call the researcher for resolving the potential problems related to performance of PMR technique.

4-Evaluation phase:

The patients' sleep quality was evaluated three times by using the same research tools; firstly, before PMR implementation (pre-test); secondly, immediately after PMR implementation (immediate-test); and thirdly, three months later after PMR implementation (post-test).

Pilot Study: -

The researcher had carried out a pilot study for 10 % (6 patients) of the overall number of participants to evaluate study tools regarding their clarity, appropriateness and essential duration for accomplishing them. The pilot study's findings were adopted to validate the outlined statistical and data analysis techniques. The study's instruments were successfully finished without trouble, reinforcing its validity. This research included patients who took part in the pilot study as a part of its overall sample

Ethical Considerations:

An initial written primary consent had been acquired from the research ethical committee affiliated to Faculty of Nursing at Minia University. The patients were provided with a thorough explanation of the research's goal and nature, and were asked to give written consent to ensure their cooperation and acceptance. Additionally, participants were being notified that their involvement in the research was being entirely

optional. Also, patients were being informed that they could leave the research whenever they wanted without giving justifications and it would not have any impact on their treatment. Patients' confidentiality was being ensured to every patient.

Statistical Analysis

Software program and statistical package for social science (SPSS version 28.0) was adopted to tabulate and

statistically analyze the gathered data. Besides, statistical analysis involved percentages (%), means, standard deviation (SD). Additionally, Chi-square test was being utilized for accurately testing the statistical significance differences between pre, immediate and posttests of PMR, Friedman test investigated mean differences between pre, immediate and posttests of total PSQI scores. While, Wilcoxon test investigated mean differences between global Pittsburg Sleeping Quality Index and socio demographic data

Results:

Table (1): Frequency distribution of the studied patients according to their socio demographic data (N = 60).

Socio- demographic data	No.	%
Age / years		
18-29	2	3.3
30-39	7	11.7
40-49	14	23.3
50-65	37	61.7
Mean ± SD	48±5.4 Years	
Marital status		
Single	6	10.0
Married	46	76.7
Widower	8	13.3
Educational level		
Illiterate	7	11.7
Basic education	8	13.3
Secondary education	32	53.3
University education	13	21.7
Occupation		
Working	16	26.7
Not working	44	73.3
Family income		
Enough	14	23.3
Not Enough	46	76.7

Table (1) shows the personal characteristics pertinent to hemodialysis patients who participated in this research. Concerning age, 61.7% of patients their age ranged from 50-65 years with mean age 48 ± 5.4 years. The highest percentage (76.7%) of the hemodialysis patients were married and 53.3 % of them graduated from secondary education. While, 73.3% of the studied patients were not working and 76.7%, their family income was not enough.

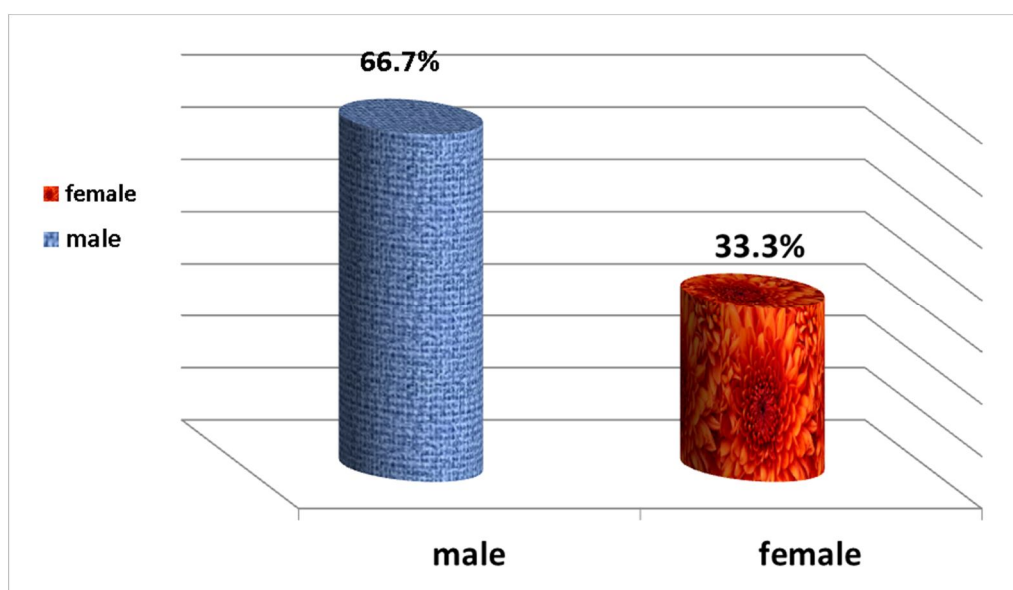


Fig. (1): Frequency distribution of the studied patients according to their gender (N = 60)

Figure (1) illustrates that 66.7% of hemodialysis patients were males. While 33.3 % of them were females.

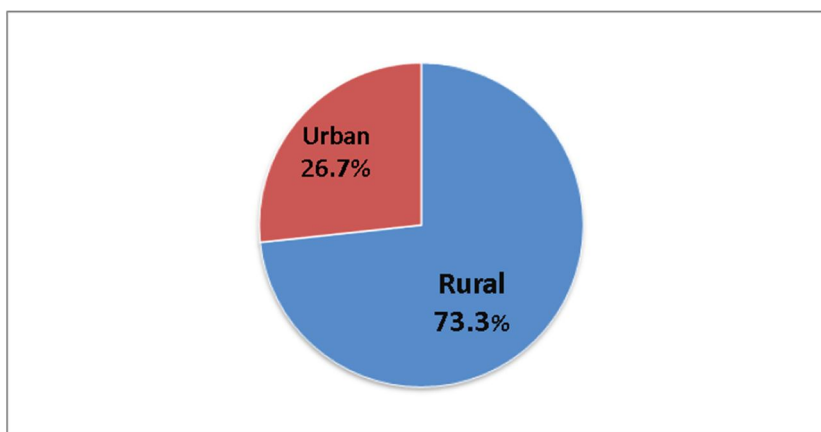


Fig. (2): Frequency distribution of the studied patients according to their residence (N = 60)

Figure (2) demonstrates that 73.3% of the studied patients came from rural regions. While 26.7 % of them came from urban regions.

Table (2): Frequency distribution of the studied patients according to their medical data (N = 60).

Medical Data	No.	%
Physical symptoms		
General weakness	28	46.7
Dizziness	48	80.0
Limb numbness	42	70.0
Muscle pain	59	98.3
Muscle cramp	57	95.0
Pruritus	50	83.3
Problems faced during the hemodialysis sessions		
Skin itching	50	83.3
Hyperthermia	2	3.3
Increased or decreased heart rate	38	63.3
Tension and discomfort	52	86.7
Disturbances of thinking and consciousness	16	26.7
Headache	58	96.7
Exhaustion	59	98.3
Nausea	37	61.7
Vomiting	12	20.0
Muscle cramp	56	93.3

Table (2) illustrates medical data of hemodialysis patients who participated in the current study. In relation to physical symptoms, this table presents that, 98.3% and 95% of the studied patients suffered from muscle pain and muscle cramp respectively. Regarding problems faced patients during the hemodialysis sessions; it was observed that 96.7% & 98.3% suffered from headache and exhaustion respectively. Regarding problems faced during the hemodialysis sessions 96.7%, 98.3% & 93.3% suffered from headache, exhaustion and muscle cramp, respectively

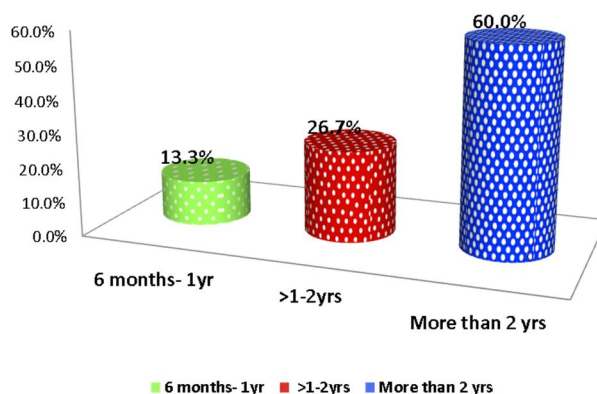


Fig. (3): Frequency distribution of the studied patients according to history of disease (N=60)

Figure (3) highlights that, 60 % of the HD patients were undergoing hemodialysis for more than 2 yrs. Whereas 26.7% and 13.3% were undergoing hemodialysis from >1-2 yrs and 6 months-1 yr respectively.

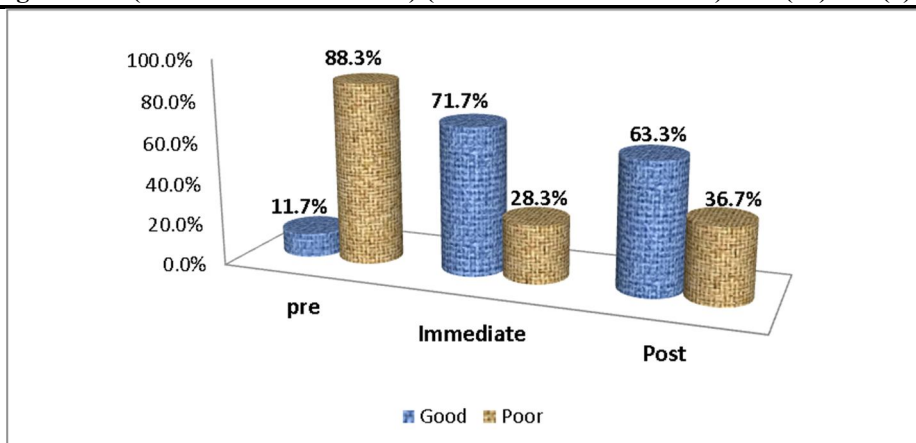


Fig (4): Frequency distribution of PSQI level among studied patients (N= 60)

Figure (4) demonstrates that at the pre-test, 88.3% of HD patients suffered from poor sleep quality and 11.7% of them suffered from good sleep quality. With respect to the immediate and post-tests, the percent of patients with good sleep quality increased to 71.7% & 63.3%, respectively, meanwhile the percent of patients suffered from poor sleep quality decreased to (28.3% & 36.7%), respectively.

Table (3): Comparison between pre, immediate, post progressive muscle relaxation technique regarding total PSQI level among studied patients (N = 60)

Total PSQI	Pre		Immediate		Post		X 2/ F [□]	P-value
	No.	%	No.	%	No.	%		
Good	7	11.7	43	71.7	38	63.3	50.73	<0.001**
Poor	53	88.3	17	28.3	22	36.7		
Mean ± SD	14.3 ± 4.2		7.6 ± 5.0		8.2 ± 4.7			

** statistically significant differences at 0.01, □ Friedman test

PSQI = Pittsburgh Sleep Quality Index

Table (3) shows that the total PSQI's mean score before implementation of the training program was 14.3 ± 4.2 decreased to 7.6 ± 5.0 immediately after PMR implementing. Meanwhile, the global PSQI's mean score at the posttest was 8.2 ± 4.7. Furthermore, highly statistical significant difference was observed between pre, immediate and post the training program among the patients regarding their PSQI level where the P-value was <.001**

Table (4): Relation between total PSQI mean score pre, immediate, post progressive muscle relaxation technique and socio-demographic data of the studied patients (N = 60)

Socio demographic data	pre			Immediate			Post		
	Mean ±SD	Wilcoxon/F [□]	P value	Mean ±SD	Wilcoxon/F [□]	P value	Mean ±SD	Wilcoxon/F [□]	P value
Age / years									
18-29	10.5 ± 6.4	58	0.014*	10 ± 5.6	52	0.001**	9.5 ± 4.9	54	0.001**
30-39	10.1 ± 4.9			6.3 ± 4.4			6.7 ± 4.2		
40-49	14.8 ± 4.2			8.8 ± 5.6			8.6 ± 5		
50-65	15.2 ± 3.6			7.3 ± 4.8			8.3 ± 4.9		
Gender									
Male	14.5 ± 3.7	-0.7400	0.383	7.3 ± 4.6	-0.057	0.955	8.2 ± 4.5	-0.024	0.981
Female	14.1 ± 5.3			8.2 ± 5.7			8.3 ± 5.2		
Residence									
Urban	11.4 ± 4.8	-3.368	0.001**	5.7 ± 3.1	-1.163	0.245	6.4 ± 3.5	-1.312	0.189
Rural	15.4 ± 3.5			8.3 ± 5.3			8.9 ± 5		
Marital status									
Single	9.7 ± 4.4	59	0.013*	6.7 ± 3.7	58	0.001**	6.8 ± 3.2	56	0.001**
Married	14.7 ± 3.8			7.5 ± 4.8			8.3 ± 4.6		
Widower	15.5 ± 4.8			9.2 ± 6.4			9 ± 6.6		
Educational level									
Illiteracy	17.1 ± 1.2	58	0.176	8.4 ± 6.2	54	0.001**	8.8 ± 5.9	57	0.001**
Basic education	15.5 ± 2.9			9.4 ± 6.3			10.1 ± 5.7		
Secondary education	13.9 ± 4.6			7.7 ± 4.7			8.5 ± 4.6		
University education	13.2 ± 4.6			6.1 ± 3.8			6.1 ± 3.3		
Occupation									
Working	12.6 ± 4.7	-2.113	0.05*	6.9 ± 4.2	-0.146	0.884	7.9 ± 4.1	-0.196	0.845
Not working	15.0 ± 3.9			7.9 ± 5.2			8.4 ± 5		
Family income									
Enough	10.1 ± 5.6	-2.963	0.001**	5.9 ± 3.3	-0.432-	0.665	6.7 ± 3.4	-0.374	0.708
Not enough	15.6 ± 2.7			8.2 ± 5.3			8.7 ± 5		

** statistically significant differences at 0.01, □ Friedman test

Table (4) presents that, statistical significant differences were detected between the global PSQI mean score and age, residence, marital status, occupation as well as family income at the pretest as p - value = .014* ,.001**,.013* , 0.05* and .001**, respectively. While at the immediate and posttests, statistical significant differences were noticed between the total PSQI mean score and age, marital status as well as educational level as p - value = .001**.

Table (5): Relation between total PSQI mean score pre , immediate, post progressive muscle relaxation technique and medical data of the studied patients (N= 60)

Medical Data	pre			Immediate			Post		
	Mean ±SDSD	Wilcoxon /F [□]	P value	Mean ±SDSD	Wilcoxon /F [□]	P value	Mean ±SDSD	Wilcoxon/F [□]	P value
Date of disease occurrence									
6 months- 1yr	15.4 ± 2.4	60	0.001**	10.1 ± 6.4	60	0.001**	10.1 ± 5.6	60	0.001**
1-2yrs	12.7 ± 5.4			6.7 ± 4.4			7.2 ± 4.3		
More than 2 yrs	14.8 ± 3.8			7.5 ± 4.8			8.3 ± 4.7		
Physical symptoms									
General weakness	14.2 ± 3.5	-1.572	0.116	8 ± 4.5	-0.970	0.332	9 ± 4.9	-0.990	0.332
Dizziness	15 ± 3.5	-1.801	0.072	7.6 ± 5	-0.638	0.523	8.4 ± 4.8	-0.603	0.546
Limb numbness	15.4 ± 3	-2.432	0.015	7.8 ± 5.1	-0.150	0.881	8.6 ± 5	-0.025	0.980
Muscle pain	14.3 ± 4.2	-1.641	0.101	7.6 ± 4.9	-1.310	0.267	8.2 ± 4.7	-0.150	0.498
Muscle cramps	14.7 ± 3.9	-1.911	0.061	7.6 ± 4.9	-0.909	0.396	8.3 ± 4.8	-0.677	0.849
Pruritic	14.6 ± 3.8	-0.322	0.747	7.8 ± 5.1	-0.327	0.744	8.5 ± 5	-0.190	0.606
Problems faced during the hemodialysis sessions									
Skin itching	14.6 ± 3.8	-0.322	0.747	7.8 ± 5.1	-0.327	0.744	8.5 ± 5	-0.190	0.606
Hyperthermia	11 ± 9.9	-0.167	0.867	4.5 ± .7	-1.104	0.270	4.5 ± .7	-1.53	0.125
Increased or decreased heart rate	14.2 ± 4.1	-0.927	0.354	7.6 ± 4.9	-0.917	0.359	8.4 ± 4.7	-0.524	0.600
Tension and discomfort	14.6 ± 3.9	-1.104	0.270	7.6 ± 5	-0.247	0.805	8.3 ± 4.8	-0.177	0.859
Disturbances of thinking and consciousness	14.6 ± 3.9	-0.271	0.786	7.1 ± 4.8	-0.264	0.792	8 ± 4.6	-0.235	0.814
Headache	14.2 ± 4.3	-0.564	0.573	7.5 ± 4.9	-0.743	0.458	8.2 ± 4.7	-0.252	0.801
Exhaustion	14.5 ± 4.1	-1.407	0.159	7.7 ± 5	-0.595	0.667	8.3 ± 4.8	-0.618	0.536
Nausea	15.6 ± 2.6	-2.060	0.039	8.3 ± 5.3	-0.627	0.531	8.8 ± 5	-0.674	0.500
Vomiting	14.9 ± 2.4	-0.460	0.646	8.2 ± 4.6	-0.895	0.371	9 ± 4.6	-0.471	0.638
Muscle cramp	14.6 ± 3.9	-1.279	0.217	7.7 ± 5	-0.917	0.359	8.3 ± 4.8	-0.514	0.607

Table (5) clarifies that statistical significant differences were observed between the total PSQI mean score of studied patients' history of disease occurrence at the pre, immediate and posttests where p - value = 0.001**.

Discussion

Sleep disturbances and emotional problems are prevalent among patients afflicted with chronic renal failure. Although these disorders are significant and occur frequently, they are often unrecognized because not all HD patients exhibit clear and evident manifestations of them (Kulikowski et al., 2022). Therefore, the current study aimed to evaluate the impact of progressive muscle relaxation technique on sleep quality among HD patients.

Regarding age, the present research demonstrated that greater than half of studied patients their age ranged between 50-65 years with mean age of 48 ± 5.4 years. This finding is concordant with the literatures which indicated that CRF was frequently observed in elderly individuals and linked to a rise in both morbidity and mortality rates. In addition, increasing age would affect the anatomy, physiology and cytology of the kidneys. This result is compatible with an Egyptian study conducted by Sayed & Younis (2016) who evaluated the effect of relaxation techniques on sleep quality for patients undergoing HD; the authors documented that greater than half of HD patients their ages were more than 50 years old with mean age 46.80 ± 10.03. Similarly, a research performed in Egypt by Mohammed et al., (2021) aimed at evaluating determinants that contribute to sleep disruption and proposing therapeutic approaches for patients receiving HD; they recorded that 48% of respondents were from 50-60 years with mean age 45.97±9.57.

Concerning marital status, the present research postulated that, the highest percentage of HD patients was married. One possible interpretation was that the greater

percent of HD patients' age were between 50-65 years with mean age in the middle stage. Besides, the prevalence of health seeking behavior was found to be higher among married individuals due to their increased sense of responsibility and concern regarding the potential negative impact of illness on their ability to fulfill various obligations. This finding is parallel to the result of a research conducted in Egypt by Ahmed et al., (2020) about measuring prevalence and etiology of CRF patients on maintenance HD; the finding showed that the greater percent of the participants were married

Regarding education, the present research showed that greater than half of patients receiving HD had secondary educational level. The possible reason may be the likelihood of a female to not have any education is almost doubles that of a male (Samir, 2020). In accordance with Egypt profile, females are more vulnerable for illiteracy as almost 25% of Egyptian females were illiterate compared to 14% among the males. The present finding was in harmony with Aziz et al., (2019), who discovered that over one third of the respondents had completed secondary level of education. Further study results were in harmony with the research which was carried out Todorova & Hristova, (2022) that proved 50% of participants graduated from secondary education.

With regards to occupation, this finding discovered that more over two thirds of patients receiving HD were not working. The possible factors contributing to unemployment could range from a lack of job opportunities to inadequate qualifications or physical limitations. In addition, the highest percent of the participants their age ranges between 50-65

years which leading to retirement. Besides, the weekly schedule of HD sessions might significantly impact patient's attendance in the workplace. The present result is well matched with a research executed in Egypt by **Kamel et al., (2022)** to assess depression and anxiety levels among patients receiving HD in Sharkia city; researchers found that more over half of cases were not working.

Moreover, the present study finding illustrated that the greatest percent of HD patients' family income were not enough. The possible interpretation might be unemployment. On the other hand, the HD patients suffer from variety of chronic diseases that represent a financial burden for them. The present finding is compatible with a research performed in Egypt by **Elsayed et al., (2019)** to examine the influence of relaxation strategies on quality of sleep, anxiety and depression among patients on HD treatment; the authors proved that most of respondents' family income were not enough.

With regard to gender, this research demonstrated that males represented over two thirds of the total HD patients. The explanation for this outcome might be attributed to the higher probability of men commencing dialysis than women. Besides, on a global scale, kidney replacement therapy is received by a higher proportion of men than women, which may be linked to biological factors and the faster advancement of CRF in men. The current result is similar to **Liu et al., (2022)** and **Lima et al., (2022)** who mentioned that males represented greater than half of the total respondents.

With respect to residence, the present study results proved that the HD patients came from rural region represented nearly three quarters from the total sample. The potential reason for this finding includes the occurrence of CRF in rural communities is higher among low-and middle-income countries. Additionally, a significantly high occurrence of kidney dysfunction was observed among individuals living in rural localities which were linked to the presence of unmanaged blood glucose irregularities and high blood pressure that often go unnoticed in this population (**Feng et al., 2019**).

The current result is widely in accordance with the outcomes performed by **Aziz et al., (2019)**; the authors documented that about two thirds of participants were living in rural areas. Likewise, a research executed in Egypt by **Elbadawy et al., (2021)** to detect common intestinal parasites' rates under maintenance HD in Benha University; they found that participants came from rural localities represented greater than two thirds.

Regarding medical data, the current findings illustrated that; the vast majority of HD patients were suffering from muscle pain and muscle cramp. This outcome might be rationalized as a disturbance in fluid or mineral balance. The present research's results are in harmony with **Flythe et al., (2018)**; they mentioned that muscle pain and muscle cramp were the most commonly experienced physical symptoms among HD patients. On the same respect, **Bhuvanewari et al., (2022)** proved that the highest percentage of participants suffered from severe muscle cramps and muscle pain.

The present research highlighted that most of patients being studied had been inflicted with headache. This outcome reflected that headache emerged as a prevalent neurological symptom category amongst HD cases which could be due to changes in electrolytes during dialysis, hypertension and being

anxious or stressed. These findings linked with **Hazim et al., (2021)**; they discovered that greater than half of HD cases had headache.

Moreover, results of the present research demonstrated that a vast majority of HD patients experienced exhaustion symptoms. HD patients' exhaustion could be referred to various influences, such as; insufficient nourishment, negative impacts caused by medications and duration of HD session. This finding is reinforced by a study executed in Egypt and held by **Hamed and Aziz (2020)** to test the effect of deep breathing exercises on level of exhaustion among patients receiving chronic HD; the authors' outcomes demonstrated that 66% of HD patients were extremely exhausted.

Furthermore, the present research findings documented that patients were undergoing HD for more than 2 yrs represented greater than half of total sample. This result reflected the importance of HD treatment modality for survival. Also, the mean lifespan of individuals subjected to dialysis treatment was estimated to be within 5 - 10 years; though, a substantial number of patients have been able to thrive on dialysis therapy for extended periods, up to 20 or 30 years. This finding is reinforced by the research executed by **Aziz et al., (2019)** who documented that 65% of respondents started renal dialysis since 3 years and more. Unlike the results of **Purba et al., (2020)**, who mentioned that greater than one third of respondents were receiving HD for less than one year.

Concerning the global mean score of PSQI, the current findings indicated that, the global PSQI's mean score before PMR implementation was elevated while decreased at the immediately and posttests. Furthermore, the current research findings indicated that, statistical significant difference was observed between pre, immediate and post training program among the patients regarding their PSQI level.

The effectiveness of PMR in enhancing quality of sleep was described in multiple mechanisms; PMR might induce a state of relaxation by diverting one's focus, reducing overall bodily tension and promoting muscular relaxation. Besides, PMR creates a state of profound relaxation by decreasing the level of electrical activity in specific brain regions, namely the inferior frontal gyrus, superior frontal gyrus, and posterior cingulate cortex result in relieving symptoms of sleep disturbance (**Yona & Dahlia, 2020**). The present findings of analysis are reinforced by **Elsayed Rady et al., (2020)** who mentioned that PSQI score before intervention was 12.3 ± 2.6 which decreased to 7.1 ± 2.2 after PMR intervention with a remarkable statistical significant difference (P -value $< .001^{**}$).

Concerning socio-demographic data in relation to total PSQI mean score, the current research discovered that statistical significant differences were detected between the overall PSQI mean score and age, residence, marital status, occupation as well as family income at the pretest. These findings assured that advanced age, rural localities, economic problems, married and unemployed persons were important risk indicators for sleep disturbances among HD patients. One possible reason for higher chances of sleep problems among older individuals could be a decreased efficiency of the sleep control system along with the existence of accompanying medical conditions, which also play a prominent role in exacerbating sleep issues for old adult. Additionally, HD patients who reside in rural regions experience heightened

degrees of poor sleep quality because of the considerable geographic distances that separate them from dialysis centers, as well as the elevated incidence of kidney failure. Likewise, **Valero et al., (2017)** had confirmed that elderly respondents had a greater likelihood to experience low sleep quality than young adults.

Moreover, sociocultural factors of economic challenges, unemployment and marital status have been noticed to contribute to elevated stress levels in individuals receiving HD treatment. As a consequence, these factors may negatively impact sleep quality of such patients. Similarly, **Rosdiana & Cahyati, (2021)** stated that employment, marital status and economic problems are important factors that can affect insomnia. Likewise, **Elsayed et al., (2019)** confirmed that a remarkable statistical significant differences were detected between the global PSQI's mean score of studied patients and age, residence, marital status, occupation and family income at p - value = 0.001**.

Furthermore, the present findings discovered that statistical significant differences were noticed between the global PSQI mean score and age, marital status as well as level of educational at the immediate and posttest. The present findings reflected that a notable decrease in the overall score of PSQI indicating good quality of sleep and advanced age, married as well as educated HD participants. The possible reasons might involve that those patients exhibited a significant response to the researcher's instructions, indicating that they perceived PMR interventions as a key component of their sleep disturbance management. The present finding is partially in the line with **Sayed & Younis, (2016)** who found a statistical significant differences between the overall mean score of PSQI and educational levels at p - value = 0.0001** after training program while no statistical significant differences were determined with marital status and age.

According to medical data in relation to total PSQI mean score, the present findings highlighted that a statistical significant differences were detected between the global mean score of PSQI of studied patients and history of disease at the pre, immediate and posttests. The current result could be interpreted by the duration of HD treatment is considered important risk factor for sleep disturbances which improved after PMR implementation regularly. On the contrary, **Mohammed et al., (2022)** discovered in their research that, no statistical significant differences were noticed between the total PSQI mean score of studied patient and all medical data.

Conclusion

The current findings concluded that the global mean score of PSQI decreased at the immediate and posttests. It was also concluded that PMR technique effectively improves sleep quality among HD patients.

Recommendations

The subsequent recommendations were offered based on the outcomes of the present research:

- A specified training program should be applied for nephrology nurses to equip them with adequate knowledge and skills regarding how to incorporate the PMR technique into routine healthcare practices for reducing the emotional impacts of illness and reliance on medication-based interventions.
- Booster sessions could be conducted on intermittent periods after the first intervention to boost the long term effect of the training program.

- Seminars should be regularly held to enhance the nurse's understanding of the psychological issues of HD telling them effective therapeutic interventions to overcome these problems.
- Future research should be created to identify treatment approaches and methods to enhance psychological status for HD patients

References

1. Ahmed, A., Zahran, M., Issawi, A. (2020). Prevalence And Etiology Of End-Stage Renal Disease Patients On Maintenance Hemodialysis. *Menoufia Medical Journal*, 33(3), 766.
2. Al- Nashri, F., Almutary, H. (2022). Impact of Anxiety and Depression on The Quality of Life of Haemodialysis patients. *Journal of Clinical Nursing*, 31(1-2), 220-230.
3. Al-Shaheen, M. Omar, M., Zakaria, Z. (2023). Evaluation Of The Role Of Multiple Dialysis Sessions In Patients With End-Stage Renal Failure On Chemerin Levels, Some Cytokines, And Several Biochemical Parameters. *Journal of Pharmaceutical Negative Results*, 14(1), 1081-1094.
4. Arslan, E., Akça, N. (2020). The Effect of Aromatherapy Hand Massage on Distress and Sleep Quality in Hemodialysis Patients: A randomized controlled trial. *Complementary therapies in clinical practice*, 39, 101136.
5. Ayirathammal, V. (2020). A Study to Evaluate the Effectiveness of Specific Nursing Intervention in the Management of Patients on Hemodialysis at Hemodialysis Unit, Tertiary Care Hospital, Chennai (Doctoral dissertation, College of Nursing, Madras Medical College, Chennai).
6. Aziz, A., Sabra, I., Barakat, M. (2019). Depression and Self-Efficacy Among Hemodialysis Patients. *International Journal of Novel Research in Healthcare and Nursing*, 6(2), 535-546.
7. Bhuvaneswari, G., Tamilselvi, S., Harini, J., Harshini, J., Parameshwari, R. (2022). A Study to Assess The Effectiveness of Intradialytic Stretching Exercises on Leg Muscle Cramp among Hemo Dialysis Patient. *Cardiometry*, (23), 79-102.
8. Buysse, D.J., Reynolds, C.F., Monk, T.H., Berman, S.R., Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index (PSQI): A new instrument for psychiatric research and practice. *Psychiatry Research*, 28(2), 193-213. The detailed scoring instructions are at the end of this journal article. Available at <https://www.sleep.pitt.edu/instruments/#psqi>. Accessed at 6/4/2021.
9. Elbadawy, A., Ezzat, A., Elkholy, A. (2021). Detection Rate of Common Intestinal Parasites in End Stage Renal Disease Patients Under Maintenance Hemodialysis in Benha University Hospital, Egypt. *Parasitologists United Journal*, 14(1), 29-33.
10. Elsayed Rady, S., Gomah Yousef, S., Ramadan Ibrahim Elrefaey, S., Samir Abdelhady, M. (2020). Effect of Muscle Stretching and Range of Motion Exercises on Sleep Quality and Anxiety among Hemodialysis Patients. *Egyptian Journal of Health Care*, 11(4), 582-601.
11. Elsayed, E., Radwan, M., Elashri, A., El-Gilany, H. (2019). The Effect of Benson's Relaxation Technique on Anxiety, Depression and Sleep Quality of Elderly Patients Undergoing Hemodialysis. *International Journal of Nursing Didactics*, 9(02), 23-31.
12. Farag, Y. M., & El-Sayed, E. (2022). Global dialysis perspective: Egypt. *Kidney360*, 3(7), 1263.
13. Feng, L., de Silva, A., Jehan, I., Naheed, A., Kasturiratne, A., Himani, G., Jafar, H. (2019). Regional Variation in Chronic Kidney Disease and Associated Factors in Hypertensive Individuals in Rural South Asia: Findings from Control of Blood Pressure and Risk Attenuation—Bangladesh, Pakistan and Sri Lanka. *Nephrology Dialysis Transplantation*, 34(10), 1723-1730.
14. Flythe, E., Hilliard, T., Castillo, G., Ikeler, K., Orazi, J., Abdel-Rahman, E., Mehrotra, R. (2018). Symptom Prioritization Among Adults Receiving in-Center Hemodialysis: a mixed methods study. *Clinical Journal of the American Society of Nephrology*, 13(5), 735-745.
15. Hamed, L. A., & Aziz, T. M. A. (2020). Effect of Deep Breathing Exercise Training on Fatigue Level among Maintenance Hemodialysis Patients: Randomized Quasi-experimental Study. *Egyptian Journal of Health Care*, 11(4), 634-644.
16. Hayati, A., Fanisaberi, L., Yaghobi, T., Pourasghar, M., Mousavinasab, N., Taraghi, Z. (2020). The effect of progressive

- muscle relaxation on depressive symptoms in elderly people. *Journal of Nursing and Midwifery Sciences*, 7(4), 248.
17. Hazim, A., Adarmouch, L., Eloury, A., Aasfara, J., Asly, M., Slassi, I. (2021). Hemodialysis-Related Headache: Still a Challenge in 2020? Effect of Conventional Versus Online Hemodiafiltration from A Study in Casablanca, Morocco. *Artificial Organs*, 45(6), 602-607.
 18. Kamel, E., Fouad, M., Goda, M. (2022). Anxiety and Depression Among Hemodialysis Patients in Egypt. *Zagazig University Medical Journal*, 28(3), 594-604.
 19. Karatas, A., Canakci, E., Turkmen, E. (2018). Comparison of sleep quality and quality of life indexes with sociodemographic characteristics in patients with chronic kidney disease. *Nigerian journal of clinical practice*, 21(11), 1461-1467.
 20. Kovessdy, C. P. (2022). Epidemiology of chronic kidney disease: an update 2022. *Kidney International Supplements*, 12(1), 7-11.
 21. Kulikowski, D., Payne, C., Hategan, A. (2022). Common Psychiatric Disorders in The Renal Patient. *Psychoneurology*, 163-178.
 22. Lima, T., Lima, T., de Abreu, G., de Lima Júnior, L., Corrêa, A. (2022). Vascular Accesses for Hemodialysis in Ceará-Brazil. *Journal of Human Growth and Development*, 32(2), 283-293.
 23. Liu, X., Wang, H., Zhang, S., Xiao, J., You, L., Zhang, Y., Zhang, Y. (2022). The Association Between Dose of Hemodialysis and Patients Mortality in A Prospective Cohort Study. *Scientific Reports*, 12(1), 1-9.
 24. Malfasari, E., Febtrina, R., Devita, Y., Herniyanti, R., Saputra, C., Azhar, B., Adelia, G. (2023). Body Images of Chronic Renal Failure Patients Undergoing Hemodialysis. *KnE Medicine*, 134-139.
 25. Mohammed Syam, N., Mohamed Desoky, G., Ahmed Mohamed Eldesoky, H. (2022). Effects of Progressive Muscle Relaxation Technique on Severity of Restless Legs Syndrome Among Patients on Maintenance Hemodialysis. *Egyptian Journal of Health Care*, 13(3), 102-120.
 26. Mohammed, A., Ragheb, M., Hamed, M., Ghonaem, S. E. (2021). Factors Affecting Sleep Disturbance and Suggested Guidelines for Patients Undergoing Hemodialysis.
 27. Muz, G., Erdoğan Yüce, G., Yıldırım, C., Dağdelen, M. (2021). The Effect Of Sleep Hygiene Training Applied To Hemodialysis Patients On Sleep Quality And Quality Of Life: randomized controlled trial. *Sleep and Biological Rhythms*, 19(3), 227-236.
 28. Nelson, L., Davis, E., Corbett, F. (2022, January). Sleep Quality: An Evolutionary Concept Analysis. In *Nursing Forum* (Vol. 57, No. 1, pp. 144-151).
 29. Purba, P., Dharmajaya, R., Siregar, T. (2020). The Effectiveness of Progressive Muscle Relaxation with Benson Relaxation on the Sleep Quality in Hemodialysis Patients. *Indian Journal of Public Health Research & Development*, 11(1), 1392-1396.
 30. Puspitosari, W. A., Rohman, H. H., Dewi, A. (2022). Reducing the hemodialysis patient stress level through progressive relaxation. *Bangladesh Journal of Medical Science*, 21(3), 540-546.
 31. Ramasamy S, Panneerselvam S, Govindharaj, P, Kumar A, Nayak R. (2018). Progressive muscle relaxation technique on anxiety and depression among persons affected by leprosy. *14(3):375-81*.
 32. Rosdiana, I., Cahyati, Y. (2021). The effect of the progressive muscle relaxation combined with lavender aromatherapy on insomnia of hemodialysis patients. *Enfermería Nefrológica*, 24(1), 39-46.
 33. Samir, N. (2020). Challenges, Opportunities for Women's Empowerment. <https://dailynewsegypt.com/2020/03/08/iwd-in-egypt-challenges-opportunities-for-womens-empowerment/>
 34. Sayed, E., Younis, A. (2016). The Effect of Relaxation Techniques on Quality of Sleep for Patients with End Stage Renal Failure Undergoing Hemodialysis. *Menoufia Nursing Journal*, 1(2), 25-37.
 35. Setyaningrum, N., Setyawan, A., Bistara, D. N. (2022). The effect of lavender essential oil aromatherapy on sleep quality in hemodialysis patients. *Jurnal Aisyah: Jurnal Ilmu Kesehatan*, 7(S2), 155-160.
 36. Taherdoost, H. (2017). Determining sample size; how to calculate survey sample size. *International Journal of Economics and Management Systems*, 2.
 37. Todorova, T., Hristova, T. (2022). Statistical Impact of Educational Attainment on Changing the Lifestyle of Hemodialysis Patients.
 38. Valero M, Martínez-Selva JM, Couto BR, D., Sánchez-Romera JF, Ordoñana JR. (2017). Age and gender effects on the prevalence of poor sleep quality in the adult population. *Gac Sanit. Jan-Feb*; 31(1):18-22.
 39. Yona, S., Dahlia, D. (2020). Effect of progressive muscle relaxation on sleep quality among patients with chronic diseases: A literature review. *Belitung Nursing Journal*, 6(2), 30-34.