

Effect of Progressive Muscles Relaxation Technique on Pain, Fatigue and Sleep Quality among Patients Undergoing Hemodialysis

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Abstract

Background: Chronic kidney disease is a slow, progressive, irreversible deterioration in renal function that results in the kidney's inability to eliminate waste products and maintain fluid and electrolyte balance that affects >10% of the general population worldwide. **Aim of the study:** Evaluate the effect of progressive muscles relaxation technique on pain, fatigue and sleep quality among patients undergoing hemodialysis. **Design:** Quasi experimental (pre and post) design was used to achieve the aim of the present study. **Setting:** This study was conducted at hemodialysis department in Sohag general hospital. **Subjects:** A purposive sample of 68 patients with end stage renal disease undergoing hemodialysis. **Tools:** Four tools were used namely Patient's Interviewing questionnaire, The Numerical Pain Rating Scale, Fatigue Severity Scale, The Pittsburgh Sleep Quality Index. **Results:** The present study revealed that (70.53%) of studied patients before progressive muscle relaxation technique implementation had severe fatigue; while (82.35%) of them had mild fatigue after progressive muscle relaxation technique implementation. Also (86.77%) of studied patients before implementation of PMRT were poor sleepers, while (69.11) of them were good sleepers after one month of PMRT application, there was a highly statistically significant positive correlation between pain scale, fatigue severity scale and Pittsburgh Sleep Quality Index. **Conclusion:** there was a highly statistically significant positive correlation between pain scale, fatigue severity scale and Pittsburgh Sleep Quality Index. **Recommendations:** Ongoing and regular in service training and educational program about progressive muscle relaxation technique prior to work in hemodialysis units, Nephrology nurses should integrate PMR in their routine care to reduce pain, fatigue, enhance sleep quality of patients.

Keywords: Hemodialysis, Pittsburgh sleep quality index, progressive muscle relaxation technique.

Introduction:

Chronic kidney disease is a progressive condition that affects >10% of the general population worldwide. Chronic kidney disease is more prevalent in older individuals, women, racial minorities, and in people experiencing diabetes mellitus and hypertension (Evans et al., 2022).

Chronic kidney disease has emerged as one of the leading causes of mortality worldwide, and it is one of a small number of non-communicable diseases that have shown an increase in associated deaths over the past two decades (Kovesdy, 2022).

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.

Patients undergoing dialysis in Egypt in 2020 are mostly men (59%), and half of them are aged ≥ 55 years. Hypertension is the most common case of ESKD at 41%, followed by diabetes at 14%, whereas glomerulonephritis is the primary diagnosis in 3% of patients undergoing dialysis (Farag et al., 2022).

Pain is a common problem among patients on hemodialysis and the origin of pain diversifies, and in general, we can categorize pain faced by hemodialysis patients into three categories: procedure-related pain, access-related pain, and pain secondary to renal disease or its complication (Kassim et al., 2023).

Fatigue is a complex phenomenon that involves physical, psychological, and emotional components. Although unrelenting chronic fatigue is common among hemodialysis patients, there are two additional patterns of fatigue related to the timing of dialysis sessions: (1) intradialytic fatigue (IDF), which develops or worsens immediately before the dialysis session and persists for the duration of the treatment, and (2) postdialysis fatigue (PDF), which develops or worsens after the end of the dialysis session and may persist for hours (Bossola et al., 2023).

The reduction in the quality of sleep experienced by patients on hemodialysis 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, 2022).

Management of patients with CKD includes treatment of the underlying causes. Regular clinical and laboratory assessment is important to keep the blood pressure below 125 to 130/80 mm Hg. Controlling cardiovascular risk factors, treating hyperglycemia, managing anemia. Medical management also includes early referral for initiation of RRT as indicated by the patient's renal status (Evans et al., 2022).

Approximately 80% of the world's population uses complementary and alternative medicine (CAM) to maintain their health. The use of CAM by the population has experienced significant growth in the last 15 years, with consequent medical, economic, and sociological impacts; this increase is especially evident in individuals with chronic diseases (Youn et al., 2022).

Progressive muscle relaxation (PMR) technique is one of the easiest techniques to be learnt and practice. This technique is safe, effective, self-induced by the patient, evidence based, inexpensive and free from side effects. It is a systematic technique through which tension and relaxation of muscles by unprompted, regularly and consecutively way until all body is relaxed and attain a deep state of relaxation through endorphins release, decrease sympathetic nervous system activities and increase parasympathetic nervous system (Gracida-Osorno et al., 2023).

Significance of the study

Chronic kidney disease (CKD) affects approximately 10% of the global adult population; collaboration estimated that there were 7.1 million CKD patients in EGYPT (Global Burden of Diseases, 2020). The most recent available estimate for the prevalence of dialysis in Egypt is in 2019 and is reported to be 0.61 per 1,000 people with an incidence estimate of 0.192 per 1,000 people (Egypt Renal Data System, 2020).

A Brazilian study carried by Novais et al., (2016) revealed that progressive muscle relaxation technique can be used as a nursing procedure. Progressive muscle relaxation technique is considered as one of the non-pharmacological methods an effective and safe non-medical intervention used for improving pain, fatigue and quality of sleep (Serin et al., 2020; Özlü et al., 2021).

AIM OF THE STUDY

This study aimed to:

Evaluate the effect of progressive muscles relaxation technique on pain, fatigue and sleep quality among patients undergoing hemodialysis.

It will be done through the following:

1- Assess pain, fatigue and sleep quality among patients undergoing hemodialysis.

2- Apply of progressive muscles relaxation technique for patients undergoing hemodialysis.

3- Evaluate the effect of progressive muscles relaxation technique on pain, fatigue and sleep quality among patients undergoing hemodialysis.

Research Hypotheses

The current study hypothesized that the implementation of progressive muscles relaxation technique will affect positively on minimizing pain, fatigue and improving sleep quality among patients undergoing hemodialysis.

Subjects and Methods:

I-Technical Design:

The technical design includes research design, setting, subjects and tools for data collection.

Research design: Quasi experimental (pre and post) design was used to achieve the aim of the present study.

Research Setting

This study was conducted at hemodialysis department at Sohag general hospital which is affiliated to ministry of health and population, Egypt. Hemodialysis department is located in the second floor; consisted from three rooms. The 1st room contains 15 beds for males and females patients who have a free viral serology, and two rooms for the positive viral serology patients, each one contains 7 beds, the 2nd for the patients who are a positive B viral serology, and 3rd room the patients who are a positive C viral serology.

Subjects: A purposive sample of 68 patients with end stage renal disease undergoing hemodialysis at the previously mentioned setting.

The sample size calculated based on a study carried out by (Sayed & Younis, 2016). By estimating an effect size 0.63, based on the mean of Pittsburgh Sleep Quality Index (PSQI) for two groups were 0.70 ± 1.081 and $.10 \pm 0.308$ and statistical power of 90%, level of confidence (1-Alpha Error): 95%, Alpha 0.05,

Beta 0.1. The sample size determines at group is 62 patients. Considering 10% sample attrition (6 patients), the final sample size in the group is 68 patients. Sample size calculates using test comparing two means through Kane SP.

Inclusion criteria:

Patients were selected according to the following criteria:

- 1.Age: 18 – 60 years.
- 2.Patients with undergoing hemodialysis via arterio-venous shunt.
- 3.Patient s with undergoing hemodialysis between 2 to 3 times per week.
- 4.Patients who agree to participate in the study.
- 5.Both sexes.
- 6.History of hemodialysis for at least 12 months.
- 7.Conscious

Exclusions Criteria:

- 1.Patients younger than 18 years of age.
- 2.Patients treated with a home-based dialysis modality
- 3.Patients receiving hemodialysis for acute renal failure.
- 4.Patients with fracture complications.
5. Severe heart disease.
6. Psychiatric disorders.

Tools for data collection: Four tools were used to collect data:

I- Patient structured interview questionnaire.

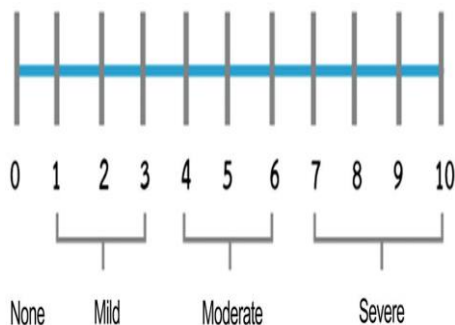
It was developed by the investigator based on review of relevant literatures as (Hassan & Ali, 2022; Stromberg, 2020; Lewis et al., 2016). It included two parts:

• **Part 1: Demographic data.** It included age, gender, marital status, educational level, occupation and residence.

• **Part 2: patients' clinical data questionnaire.** It included medical data related items such as past and present medical history, number of sessions per week, duration of sessions, treatment received.

II- The Numerical Pain Rating Scale

It was designed by **McCaffery and Beebe (1989)**., translated into Arabic language by **Alghadir et al. (2016)**. It was used to assess pain scale among patients undergoing hemodialysis. Patient is asked to make pain rating, from 0 to 10 in which 0 equal no pain and 10 equal sever pain.



Scoring System

- 0 represent no pain.
- 1 to 3 represent Mild pain
- 4 to 6 represent Moderate pain
- 7 to 10 represent Severe pain

III- Fatigue Severity Scale.

This scale was adopted by **(Krupp et al. 1989)**., translated into Arabic language **(Ali, 2016)**. It consists of nine statements to assess the severity of the patient's fatigue symptoms in terms of how these symptoms affect motivation, exercise, physical function, and activities of daily living. The patient is asked to circle a number from 1 to 7, depending on how appropriate they felt the statement applied to them. As regard fatigue level a low value

indicates strongly disagree and a high value indicates strongly agree.

Scoring System of Fatigue Severity Scale.

Patients rate each item from 1 to 7 based on the extent to which they agree or disagree with each statement (1 = strongly disagree, 7 = strongly agree). The FSS can be assessed either by obtaining a total score or by calculating average score on all nine items, with higher scores indicating more severe fatigue. A total score of less than 36 suggests that you may not be suffering from fatigue.

- (36 – 44) represent mild fatigue.
- (45 - 53) moderate fatigue.
- (54 -63) sever fatigue.

VI - The Pittsburgh Sleep Quality Index (PSQI)

This scale was adopted by **(Buysse et al.1989)**, translated into Arabic language by **(Ali 2016)**. The scale is used to measure the quality of sleep and to help discriminate between individuals who experience poor sleep versus individuals who sleep well. This questionnaire is used to assess sleep quality during the previous month. It comprised 19 self-rated questions that yielded information related to seven components (subjective quality of sleep, delay in falling asleep, sleep adequacy, sleep duration, sleep disturbances, use of sleep medications, and daily dysfunction). Moreover to evaluate sleep quality before and after the intervention. Most of questionnaire items are organized in brief and easy to understand and answer.

Scoring System of Pittsburgh Sleep Quality Index

Global PSQI Score is the sum of seven components scores. The score of each component ranged from zero (no problem) to three (severe problem). The total score ranges from zero to 21 where higher scores indicate a poorer quality of sleep, score five or more shows that the person has a sleep problem, and a total score of less than five indicates a good sleep quality. Time to complete PSQI scale: 5–10 min.

II- Operational design: -

The operational design includes preparatory phase, validity, reliability, pilot study, field work and ethical consideration.

1. Preparatory phase

It included reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop the theoretical part of the study and data collection tools.

2. Validity

This stage was achieved through a jury of 5 experts, three of them professors, one assistant professor, and one lecturer from the Medical-Surgical Nursing department at faculty of nursing, Ain Shams University. The experts reviewed the tools for clarity, relevance, comprehensiveness, and simplicity; minor modifications were done accordingly.

Content validity: is the degree to which a test or assessment instrument evaluates all aspects of the topic, construct, or behavior that it is designed to measure (Schaufeli, et al., 2020).

3. Tools Reliability:

The tools were measured to ensure that an assessment tool produces stable with consistent result overtimes. The reliability coefficient for the study tools were calculated using the correlation coefficient Cronbach's alpha test which is a model of internal consistency was used in the analysis of Numeric Pain Rating Scale, Fatigue Severity Scale, Pittsburgh Sleep Quality Index (PSQI) were (0.807, 0.903 and 0.917 respectively).

4. Pilot study

A pilot study was conducted on (7 patients) 10% of all patients who fulfilled the inclusion criteria to ensure objectivity, clarity, feasibility, and reliability of the study tools. The pilot study gave the investigator experience to deal with the included participants, the research methodology, the data collection instruments, and to estimate the needed time to fill the data collection sheets. Based on results of the pilot study, no modifications were done, so patients of the pilot study were included in the study sample.

5. Ethical considerations:

The ethical research consideration in this study included the following:

- Approval of protocol was obtained from the ethical Committee in the faculty of nursing at Ain Shams University before starting the study.
- The investigator clarified the objective and aim of the study to the patients included in the study.
- The investigator assured maintained anonymity and confidentiality of the subjects' data.
- Patients were informed that they were allowed choose to participate or not in the study and that they have the right to withdraw from the study at any time without giving any reasons.
- Values, culture, and beliefs of patient were respected.

6. Field work

- The actual fieldwork started and completed within in sex months from the beginning of January to the end of June 2024, 10 to 11 patients per week were interviewed, during patient's hemodialysis sessions at hemodialysis department in Sohag General Hospital.
- Data were collected by the investigator during patient's interview three days per week, from 10.00 am to 2.00 pm at hemodialysis department in Sohag General Hospital. The investigator met about three to five patients every visit.
- The time needed for completing the tools was about 10-20 minutes for every patient. The tool of patient structured interview questionnaire needed about 3-5 minutes. Numerical Pain Rating Scale needed about 1-3 minutes minutes, Fatigue Severity Scale needed about 1-3 minutes and Pittsburgh Sleep Quality Index (PSQI) needed about 5-10 minutes. The patients assured that the information collected would be treated confidential and that it would

be used only for the purpose of the study (verbal consent was taken from the patients).

The study was conducted through four phases as follow:

- a. Assessment phase.
- b. Planning phase.
- c. Implementation phase.
- d. Evaluation phase.

a- Assessment phase:

During this phase, the researcher also visited the selected places to be acquainted with the staff, the patients and the study settings. Conducted to each participant by the researcher to collect demographic data, medical history & clinical variables and sleeping quality pain assessment of patients. The researcher also clarified to the participants that pain, fatigue and sleep quality scales would be assessed two times. The first time for measurement was done without any intervention, pre the intervention.

b- Planning phase:

During these phases the researcher prepared the theoretical sessions and hand out based on review of literature that includes books, journals, articles. Based on the information obtained from pilot study and patients' assessment, in addition to the recent literature review.

c- Implementation phase:

Implementation was done via subsequent sessions, which would cover the training program:

Session 1: Introduction about the research (purpose, required time for sessions and content), within 5-10 minutes and according to patient attention.

Session 2: Brief introduction about chronic renal failure and hemodialysis within 5-10 minutes and according to patient attention.

Session 3: Brief introduction about pain, fatigue and sleep disturbance suffered by chronic

Session 4: Practicing deep breathing exercise about 3-5 minutes and according to patient attention. 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, within 10 minutes and according to patient attention.

Session 6: Practicing progressive muscle relaxation technique, within 20-25 minutes. 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 marital status (67.6%) were married. Regarding researcher's phone number was given to the to level of education (33.82%) of the studied patients to call the researcher for resolving the patients had secondary education. Regarding to potential problems related to performance of PMR occupation (35.3%) of them were not work. Regarding to residence (76.47%) of them were living in rural areas.

d- Evaluation phase

By comparing the result pre-post PMRT implementation effect on pain, fatigue and sleep quality on hemodialysis patients by using the same data collection tools which were used pre implementation and after one month from the implementation.

III- Administrative design

- An official written Permission for conducting the study was obtained from the Faculty of Nursing, Ain Shams University to the director of to the hospital director of Sohag General Hospital, Sohag governorate, Egypt.

- The informed consent to participate in the current study was taken after the purpose of the study was clearly explained to each patient.

IV Statistical design

The statistical analysis of data was done by using the computer software of Microsoft Excel Program and Statistical Package for Social Science (SPSS) version 26.0 Data were presented using descriptive statistics in the form of frequencies and percentage for categorical data, the arithmetic mean ($\bar{X}$) and standard deviation (SD) for quantitative data. Qualitative variables.

Results:

Table (1) illustrates that (47.1%) of the studied patients their age ranged between (51 – 60) years, more over the Mean $\pm$ SD of age is (3.21 $\pm$ 0.907) years. As regard to gender, about (64.7%) of them were male. Regarding to

Figure (1): demonstrates that (67.64%) of studied patients before progressive muscle relaxation technique implementation had severe pain; while after progressive muscle relaxation technique implementation (55.88%) of them had moderate pain. There is a highly statically significant difference as regard to total features of pain levels with total mean and standard deviation (7.19 $\pm$ 1.307), (3.74 $\pm$ 0.637) pre and post progressive muscle relaxation technique implementation respectively.

Table (2) shows there is a highly statically significant difference of fatigue severity scale items with total mean and standard deviation (55.15 $\pm$ 5.120), (37.74 $\pm$ 3.484) pre and post the implementation of progressive muscle relaxation technique respectively.

Figure (1): show that the majority (86.77%) of studied patients were poor sleepers, before implementation of progressive muscle relaxation technique, while more than two thirds (69.11%) of them were good sleepers, after one month of progressive muscle relaxation technique implementation.

Table (1): Frequency distribution of the studied patients according to their demographic data (n=68).

Table (2): Frequency distribution of the studied patients according to their demographic data (n = 68).		
Demographic data	No. = 68	%
Age		
18 - 28 years old	4	5.9
29 - 40 years old	10	14.7
41 - 50 years old	22	32.4
51 – 60 years old	32	47.1
Mean± SD	3.21 ± 0.907	
Gender		
Male	44	64.7
Female	24	35.3
Marital status		
Single	4	5.99
Married	46	67.60
Widow	18	26.41
Level of education		
Can't read or write	3	4.41
Read and write	10	14.7
primary education	17	25
Intermediate education	9	13.23
Secondary education	23	33.82
High education	6	8.82
Occupation		
Employee	6	8.8
Farmer	20	29.4
Worker	18	26.5
Not work	24	35.3
Residence		
Urban	16	23.53
Rural	52	76.47

Figure (1): Percentage distribution of pain level of the studied patients' pre and post progressive muscle relaxation technique implementation (n=68).

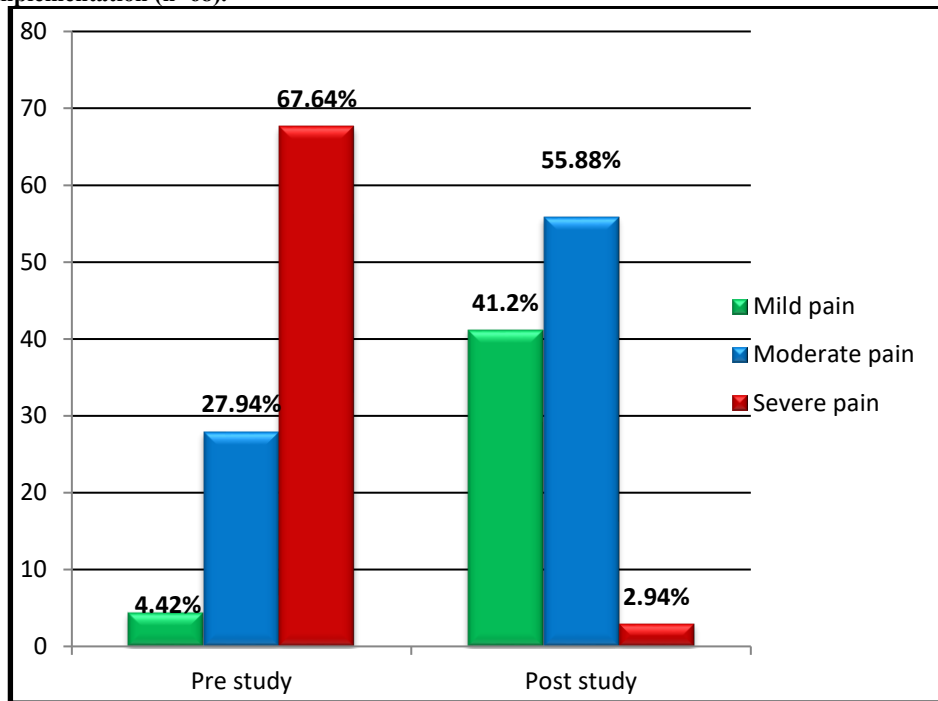
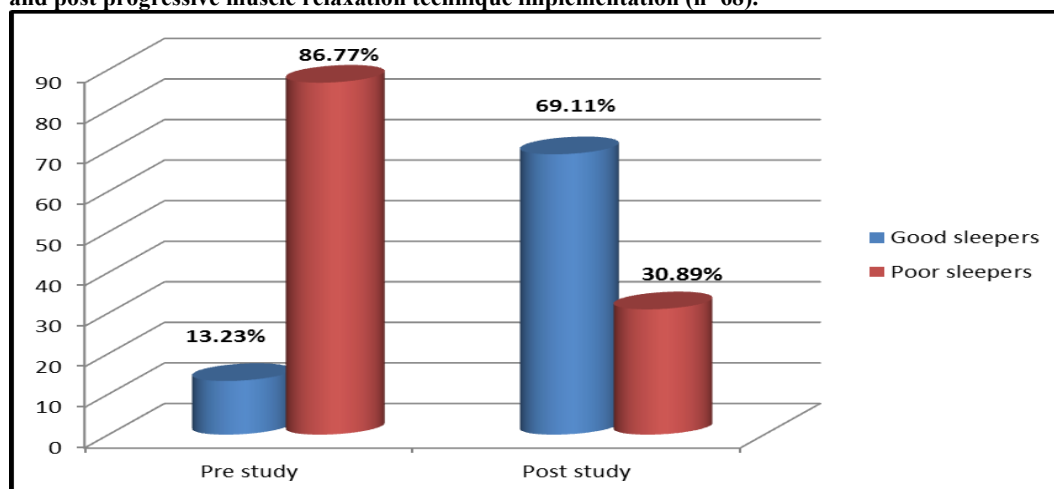


Table (2): Frequency distribution of fatigue severity of the studied patients pre and post progressive muscle relaxation technique implementation (n=68).

Variables	Pre study Mean $\pm$ SD.	Post study Mean $\pm$ SD.	P value
1. My motivation is lower when I am fatigued.	5.97 $\pm$ 0.863	3.82 $\pm$ 0.929	0.000**
2. Exercise brings on my fatigue.	6.15 $\pm$ 0.851	3.68 $\pm$ 0.871	0.000**
3. I am easily fatigued.	6.09 $\pm$ 0.893	4.06 $\pm$ 0.808	0.000**
4. Fatigue interferes with my physical functioning.	6.18 $\pm$ 0.929	4.35 $\pm$ 0.910	0.000**
5. Fatigue causes frequent problems for me.	6.26 $\pm$ 0.891	4.32 $\pm$ 1.085	0.000**
6. My fatigue prevents sustained physical functioning.	6.12 $\pm$ 0.907	4.41 $\pm$ 0.777	0.000**
7. Fatigue interferes with carrying out certain duties and responsibilities.	6.21 $\pm$ 0.907	4.21 $\pm$ 1.001	0.000**
8. Fatigue is among my three most disabling symptoms.	6.09 $\pm$ 0.748	4.56 $\pm$ 0.887	0.000**
9. Fatigue interferes with my work, family, or social life.	6.09 $\pm$ 0.859	4.32 $\pm$ 1.029	0.000**
Total Fatigue	55.15$\pm$5.120	37.74$\pm$3.484	0.000**

No Significant at $P \geq 0.05$. *Significant at $P \leq 0.05$. **highly statically significant at $P \leq 0.01$.

Figure (2): Percentage distribution of total levels of Pittsburgh Sleep Quality Index scale for patients' pre and post progressive muscle relaxation technique implementation (n=68).



Discussion:

Chronic Renal Failure (CRF) results from a range of causal factors leading to the incapacity to effectively excrete metabolic waste and carry out normal renal processes. Chronic Renal Failure (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 (Malfasari et al., 2023).

Musculoskeletal disorders (MSDs) are commonly encountered in hemodialysis (HD) patients include weakness; reduce activity, fatigue, pain and poor sleep quality. Cutaneous system changes include gray-bronze skin color, pruritus, thin and brittle nails (Nassar et al., 2023).

Discussing the findings of the current study is categorized under seven main parts. **The first part** is concerned with the demographic data of the studied patients, **the second part** includes the medical data of the studied patients undergoing hemodialysis, **the third part** deals with patients' numerical pain scale score pre and post PMRT implementation, **the forth part** deals with patients' fatigue severity scale score pre and post PMRT implementation, **the fifth part** is concerned with patients' sleep quality score pre and post PMRT implementation, **the sixth part** is

concerned with relationship between studied variables and **the seventh part** is concerned with correlation between studied variables.

Part I: Demographic characteristics of the studied patients.

Regarding the **age** of the patients, the results of current study revealed that less than the half of the studied patients their age was ranged between (51 – 60) years, more over the Mean $\pm$ SD of age is (3.21 $\pm$ 0.907) years. The reason from the investigator's point of view is 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 finding was in agreement with (Sanad et al., 2023) who conducted a study about "Effect of PMRT on Sleep Quality among Hemodialysis Patients" who indicated that more than two fifths of the studied patients were from 51 years old to less than 60 years old. This finding is parallel to the result of a research conducted by (Syam et al., 2022) who carried a study about "Effects of PMRT on severity of restless legs syndrome among patients on maintenance hemodialysis" reported that that near than the half of the studied patients were from 51 years old to less than 60 years old.

Regarding the gender, the present study showed that about two thirds of them was male. The reason from the investigator's point of

view, is that 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. This finding was consistent with the study carried by (Dikmen & Aslan, 2020) who conducted a study about "The Effects of the Symptoms Experienced by Patients Undergoing Hemodialysis Treatment on their Comfort Levels" revealed that more than half of patients were male.

Regarding the marital status the present study results revealed that more than two thirds were married. That is due to their increase sense of responsibility and concern regarding the potential negative impact of illness on their ability to fulfill various obligations. This finding was constant with the result of a research conducted by (Ghozhdhi et al., 2022) which entitled "The Effect of PMRT on Fatigue, Pain and Quality of Life in Dialysis Patients" who reported that more than three quarters of studied patients were married, this result also was constant with the study carried in Nigeria by (Adejumo et al., 2023) which entitled "Sleep quality and associated factors among patients with chronic kidney disease in Nigeria" who reported that more than three quarters of studied patients were married.

Concerning educational level, the present study results indicated that more than one third of the studied patients had secondary education. The current findings were contradicting with a study done by (Al Salmi et al., 2021) who conducted a study entitled "stated that two fifths of the patients were not educated or educated only up to the primary level. This result inconstant with the study carried by (Abdel kader et al., 2022) who conducted a study about "Factors affecting sleep pattern disturbance for hemodialysis patients in port-said hospitals" who mentioned that more than two fifth of studied patients were illiterate.

Regarding occupation the present study showed that more than one third of the studied patients were not working. The reason from the investigator's point of view, 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 50-60 years which leading to retirement. Besides, the weekly schedule of HD sessions might significantly impact patient's attendance in the workplace.

This finding was consistent with the study carried by (Albadry et al., 2020) who conducted a study about "Effect of Intradialytic Hemodialysis Exercises on Fatigue and Leg cramps" who indicated that more than one third of the studied patients were not working. This finding similar to the result of a research conducted by (Ju et al., 2021) who conducted a study entitled "Patient-led identification and prioritization of exercise interventions for fatigue on dialysis" who reported that more than one third of the studied patients were unemployed.

Concerning residence the results of current study revealed that more than three quarters of the studied patients was living in rural areas. The reason from the investigator's point of view is that 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.

This finding was consistent with the study carried by (Sanad et al., 2023) who conducted a study about "Effect of PMRT on Sleep Quality among Hemodialysis Patients" who reported that more than three quarters of the studied patients was living in rural areas. This finding is parallel to the result of a research conducted by (Marzouq et al., 2021) who conducted a study which entitled "Exploring factors associated with pain in hemodialysis patients" reported that more than three quarters of the studied patients was living in rural areas. This finding in disagreement with a research conducted by (Ali & Hassan, 2020) who conducted a study which entitled "The effect of an educational program on quality of life for patients with chronic renal failure" who

showed that more than the half of the studied patients was living in urban areas. In addition to study done by (Elsayed et al., 2022) who conducted study about "Dialysis recovery time: associated factors and its association with quality of life of hemodialysis patients" who reported that more than the half of the studied patients was living in urban areas.

Part (II): Numerical pain scale of the studied patients' pre and post PMRT implementation. The present study showed a statistical significant different in pain scale of the studied patients post- PMRT implementation comparing pre- PMRT implementation assessment. The improvement from the investigator's point of view is that initially Jacobson's progressive muscle relaxation simplicity and accessibility. Secondly, Jacobson's progressive muscle relaxation serves as a coping mechanism by providing a structured and calming activity that helps patients transition into a more relaxed state decreasing pain.

Also according to investigator's point of view it focuses on mental relaxation and mindfulness may indirectly decrease pain scale by boosting mood and emotional well-being, lastly Jacobson's progressive muscle relaxation is a powerful non- pharmacological valuable tool for better pain management. Its calming techniques help manage stress and improve relaxation, offering a drug-free alternative with no risk of side effects This result supported by (Dos Santos et al., 2024) who conducted a research entitled "Pain in Patients With Chronic Kidney Disease Undergoing Hemodialysis" reported that there was a statistically significant differences in pain score pre and post PMRT implementation. This finding goes in the same line with research titled " The Effect of Progressive Relaxation Exercises on Pain, Fatigue, and Quality of Life in Dialysis Patients" conducted by (Serin et al., 2024). Who reported that there was a statistically significant difference in pain score pre and post PMRT. The present study demonstrates that more than two thirds of studied patients before PMRT implementation had severe pain; while after PMRT implementation more than the half of them had moderate pain. This finding goes in the same line with research carried by (Al

Hasbi et al., 2019) titled "Progressive muscle relaxation to reduces chronic pain in hemodialysis patient" Who reported that more than two thirds of studied patients before PMRT implementation had severe pain; while after PMRT implementation more than the half of them had moderate pain

Part (III): Fatigue severity scale of the studied patients' pre and post PMRT implementation. The present study showed a statistical significant different in fatigue severity scale of the studied patients post- PMRT implementation comparing pre- PMRT implementation. The improvement from the investigator's point of view is that initially Jacobson's progressive muscle relaxation simplicity and accessibility. Secondly, Jacobson's progressive muscle relaxation serves as a coping mechanism by providing a structured and calming activity that helps patients transition into a more relaxed state relieving fatigue.

Moreover according to investigator's point of view it focuses on mental relaxation and mindfulness may indirectly improve fatigue scale by boosting mood and emotional well-being, lastly Jacobson's progressive muscle relaxation is a powerful non- pharmacological valuable tool for better management. Its calming techniques help manage stress and improve relaxation, offering a drug-free alternative with no risk of side effects.

This result supported by (Boughdady et al., 2024) who conducted a study about "Effect of Jacobson's Progressive Muscle Relaxation on Fatigue and Sleep Quality among Geriatric Patients Undergoing Hemodialysis". This finding is parallel to the result of a research conducted by (Ghozhdhi et al., 2022) which entitled "The Effect of PMRT on Fatigue, Pain and Quality of Life in Dialysis Patients: A Clinical Trial Study" who reported a statistical significant different in fatigue severity scale of the studied patients post- PMRT implementation comparing pre- PMRT implementation. This finding disagreed with a study conducted in Iran by (Ghobadi et al., 2019) whose study named "Studying the effect of PMRT on fatigue in hemodialysis patients – Kermanshah- Iran" suggested that there was no

significant difference the mean changes of fatigue before and after progressive muscle relaxation in control and experiment groups. This might be due to failure to control other effective factors.

The present study shows that more than two third of patients were suffering from severe fatigue before PMRT implementation. While majority of patients were suffered from mild fatigue after PMRT implementation, this result in the same line with a study conducted by (Albadry et al., 2020). Who conducted a study entitled "Effect of Intradialytic Hemodialysis Exercises on Fatigue and Leg cramps" showed that more than two third of patients were suffering from severe fatigue.

This finding was disagreed with research done by (Siregar & Nasution, 2018) titled "PMRTs effectiveness against The Difference of Fatigue Level of Patients Undergoing Hemodialysis in Medan" reported that half of the studied patients had severe fatigue before PMRT implementation, while half of the studied patients had moderate fatigue after PMRT implementation.

Part (IV): Sleep quality scale of the studied patients' pre and post PMRT implementation.

The present study showed a statistical significant different in sleep quality scale of the studied patients in post- PMRT implementation comparing to pre- PMRT implementation. The improvement from the investigator's point of view is that initially Jacobson's progressive muscle relaxation simplicity and accessibility. Secondly, Jacobson's progressive muscle relaxation serves as a coping mechanism by providing a structured and calming activity that helps patients transition into a more relaxed state conducive to sleep. It focuses on mental relaxation and mindfulness may indirectly improve sleep quality by boosting mood and emotional well-being, lastly Jacobson's progressive muscle relaxation is a powerful non- pharmacological valuable tool for better sleep intervention. Its calming techniques help manage stress and improve relaxation, offering a drug-free alternative with no risk of side

effects. This finding was in harmony with (Dyah et al., 2020) who conducted a study about " Effect of Jacobson's Progressive Muscular Relaxation on Sleep Quality in Geriatric at Budi Agung Social Institution" who reported that there is a a statistical significant different in sleep quality scale of the studied patients in post- PMRT implementation comparing to pre- PMRT implementation. This finding was in agreement with (Yang et al., 2024) whose study named "Effects of progressive muscle relaxation therapy on Maintenance hemodialysis patients" showed a statistical significant different in sleep quality scale of the studied patients in post- PMRT implementation comparing to pre- PMRT implementation. The present study shows that the majority of studied patients before implementation of PMRT were poor sleepers, while after one month of PMRT implementation more than two thirds of them were good sleepers. This result was consistent with the study carried (Boughdady et al., 2024) who conducted a study about" Effect of Jacobson's Progressive Muscle Relaxation on Fatigue and Sleep Quality among Patients Undergoing Hemodialysis" who reported that the majority of studied patients before implementation of PMRT were poor sleepers, while after one month of PMRT implementation more than two thirds of them were good sleepers. The current research indicated that the global PSQI mean score before PMR implementation was (13.88±4.199), while after one month of PMRT implementation significantly decreased to (4.12±1.920). Furthermore, the current research findings indicated that, statistical significant difference was observed between pre and post PMRT implementation the patients regarding their PSQI level. The reason from the investigator's point of view is that the effectiveness of PMR in enhancing quality of sleep was described in multiple mechanisms; 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 reliving symptoms of sleep disturbance (Yona &Dahlia, 2020). This finding was in agreement with (Sanad et al., 2023) who conducted a study about "Effect of

PMRT on Sleep Quality among Hemodialysis Patients" who reported significant decrease in the total PSQI,s mean score before implementation of the training program was 14.3 ± 4.2 decreased to 8.2 ± 4.7 after PMR implementing. This finding was agreed with (Fauzi et al., 2021) who conducted a study about " The effect of intradialytic stretching training on restless legs syndrome and sleep quality in hemodialysis patients " who reported that there is a significant decrease in the total PSQI,s mean score before implementation of the training program was 12.89 ± 4.5 decreased to 7.77 ± 3.6 after PMR implementing.

CONCLUSION

In the light of the study findings, progressive muscle relaxation was significantly has a positive effect on the reduction of pain, fatigue scale and enhances sleep quality of patients undergoing haemodialysis pre and post PMR technique implementation.

RECOMMENDATION

Based on the results of the present study, the following recommendations are suggested in relation to nursing practice, nursing education and further nursing research:

Nursing practice:

- Ongoing and regular in service training and educational program about progressive muscle relaxation technique prior to work in hemodialysis units, nursing staff must be knowledgeable and skillful in providing professional care for patients undergoing hemodialysis.

- Nephrology nurses should integrate PMR in their routine care to reduce pain, fatigue, enhance sleep quality and other psychological effects. Moreover decrease the dependence on pharmacological measures.

- Formulate unit protocol regarding progressive muscle relaxation technique procedure and should be reviewed regularly and updated based on new evidence for best practice.

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