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Effect of progressive muscle relaxation technique on anxiety and sleep quality among hemodialysis patients

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Abstract
Background: Patients on hemodialysis suffer from a variety of stressors and psychological problems as sleep disorders and anxiety. Progressive muscle relaxation is one of nursing modalities that can be applied to patients undergoing hemodialysis to decrease these problems.
Aim: Evaluate the effect of progressive muscle relaxation technique on anxiety and sleep quality among hemodialysis patients.
Research design: The aim of this study was achieved through utilizing a pre-posttest quasi-experimental research design.
Sample: 60 adult patients with chronic renal failure who were receiving hemodialysis at the Minia University Hospital for Urology and Nephrology were chosen as a purposeful sample.
Tools: Structured Interview Questionnaire Sheet, Beck Anxiety Inventory and Pittsburg Sleeping Quality Index were utilized in this research.
Results: The global mean score of anxiety and sleep quality levels reduced immediately and post implementing the training program. Statistical significant positive correlation was observed between the global sleep quality and anxiety scores at the pre, immediate and post training program.
Conclusion: Progressive muscle relaxation technique is an efficient method to mitigate anxiety and enhance quality of sleep for patients receiving hemodialysis.
Recommendation: A training program should be applied for nephrology nurses to equip them with adequate knowledge and skills regarding how to integrate progressive muscle relaxation technique in their daily care for relieving the psychological consequences and reliance on pharmacological treatments.

Keywords: Anxiety, hemodialysis patient, progressive muscle relaxation, sleep quality

Introduction
Chronic Renal Failure (CRF) is a worldwide serious health concern that has the potential to become an epidemic, and significantly decreases the quality of life for affected individuals. CRF is a gradual and permanent loss of kidney performance, leading to inability of the body to maintain proper metabolic, fluid, and electrolyte balance, ultimately leading to the development of either uremia or azotemia [1]. Fawzy *et al*., [2] stated that the prevalence of CRF has greatly risen in developing nations like Egypt. Hemodialysis (HD) is the most common form of medical management of patients affected by CRF which constitutes 89% of the global treatment for those patients [3].According to Priyadharshini [4], HD is a process of removing solutes from the body using a semipermeable artificial membrane that maintains the fluid and electrolytes in normal homeostasis. In this respect, Muchtar *et al*., [5] stated that HD patients are faced with many stressors and psychological problems such as sleep disorders and anxiety.
According to Videbeck, [6] anxiety can be described as an ambiguous uneasy feeling of discomfort or dread followed by an autonomic reaction; a feeling of apprehension generated by threat anticipation. In addition, anxiety can often go unnoticed as a psychiatric manifestation among patients receiving HD for CRF despite its frequent occurrence. Experiencing restlessness while being attached to the dialysis machine for extended periods and anticipating physical symptoms can trigger a cycle of anxious anticipation and heightened physiological arousal, ultimately resulting in panic attack [7].
The concept of sleep quality holds a great significance in clinical practices and research that focuses on sleep-related issues.

The quality of sleep can be defined as the extent to which an individual feels invigorated, alert, and prepared for the day ahead, encompassing both quantitative and qualitative elements. The notion of quality of sleep encompasses various factors, such as the duration it takes to fall asleep, total hours slept, frequency of waking up during the night, level of deep sleep achieved and the degree of relaxation felt during sleep [8].

Furthermore, insufficient sleep quality may serve as a potential marker for individuals diagnosed with CRF who receive maintenance HD. Although the exact reasons of sleep disruptions in individuals undergoing HD are not entirely understood, it is acknowledged that they result from a combination of various factors. The common observed conditions which can adversely contribute to the emergence of sleep disruptions in CRF patients receiving HD include pharmacological interventions, metabolic imbalance, malnourishment, exhaustion, muscle spasms, and psychological issues [9].

In a study conducted by Sentürk and Kartin, [10] showed that physiological complications are often associated with sleeping difficulties and anxiety among individuals undergoing HD treatment. Sleep-related disorders can result in excessive sleepiness during the day and elevated anxiety levels. Additionally, anxiety can cause serious sleep issues such as insomnia. Bohm *et al*., [11] added that sleep and anxiety issues experienced by HD patients have a negative impact on their daily activities, resulting in decreased performance, energy, self-care capability and overall quality of life.

Anxiety and sleep disorders can be treated using both pharmaceutical and non-pharmaceutical approaches. Pharmacological methods are mainly costly and associated with side effects, so seeking out appropriate alternative treatments becomes necessary [10]. One of the nursing strategies known as progressive muscle relaxation (PMR) has been developed to alleviate stress, anxiety, and sleep disturbances. The intention behind adopting this technique is to promote recognition of tense sensations, alleviate muscle tension and develop means to achieve full muscle relaxation [12].

Extensive researches have been conducted on PMR therapy, which is widely recognized as a promising approach to address negative emotions [13]. Özlü *et al*., [14] added that regularly practicing PMR with proper techniques can assist patients in managing their anxiety levels and enhancing their quality of sleep. In addition, this technique helps to decrease lactic acid production, stress, tension, heart rate, blood pressure and pain sensitivity.

Psychiatric nurses have a crucial role in administering emotional support to mitigate anxiety and enhance sleep quality of HD patients. Besides, nurses are responsible about confirming that patients are getting sufficient sleep and rest as well as detecting the underlying factors that cause discomfort, anxiety and disturbances in patients' sleep and take appropriate measures to alleviate them [15]. In this regard, PMR is a nursing approach that can be utilized to mitigate symptoms of anxiety and sleep disturbances in patients receiving HD treatment. Nurses should take into account the utilization of this approach as a substitute strategy to lessen the psychological issues associated with HD [16].

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 [17].

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 [18].

An Egyptian study by Elsayed Rady *et al*., [19] documented that (53.3%) of individuals undergoing hemodialysis suffer from moderate level of anxiety and more than three quarters (76.7%) of them had low sleeping quality. In addition, George *et al*., [20] reported that severe anxiety level was found among HD patients. While Setyaningrum *et al*., [21] proved that the highest percent of HD patients was suffering from sleep problems. In addition, several studies show that better function of PMR in managing the symptoms associated with anxiety and sleep problem in patients with HD. Consequently healthcare professionals can integrate these secure programs in their care plans [22].

Furthermore, effective management of these stressors is essential human right for CRF patients on hemodialysis. So, PMR is an effective nursing intervention, which reduces discomfort, anxiety and improves quality of sleep for these patients. Subsequently, the present research was performed to evaluate the effect of PMR technique on anxiety and sleep quality among CRF patients undergoing HD.

Aim of the Study

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

Research hypotheses

H1: Hemodialysis patients who will practice progressive muscle relaxation technique will have lower levels of anxiety.

H2: Hemodialysis patients who will practice progressive muscle relaxation technique will have good sleep quality.

Subjects and Method

Research design

Quasi-experimental research design (Pre and post-test) was used in the present study.

Setting

The Dialysis Unit at Minia University Hospital for Urology and Nephrology was selected to carry out the present study. 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.

Subjects

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 is utilized to determine the appropriate sample size [23].

$$N = \frac{t^2 \quad x \quad p\,(1\text{-}p)}{m^2}$$

Inclusion criteria

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

Exclusion criteria

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

Study tools

Tool I: Structured Interview Questionnaire

This tool was constructed by the researcher and consisted of 2 portions:-

Part one: Socio-demographic Data Sheet

It included data related to socio-demographic attributes of HD 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: Beck Anxiety Inventory (BAI)

The scale was constructed by Beck *et al*., [24] to describe common symptoms of anxiety. The scale was consistent of 21 items. The participants were requested to estimate the extent to which they were afflicted by every symptom during the past week through 4-point scale from 0 (Not at all) to 3 (Severely-it bother me alot). A global score was calculated from the items and can vary from 0 to 63 and classified as:

- 0-21 = low anxiety
- 22-35 = moderate anxiety
- 36 and above = severe anxiety.

Tool III: Pittsburg Sleeping Quality Index (PSQI)

The scale was originally constructed by Buysee *et al*., [25] to assess patient's sleep quality and to examine the diverse factors that impact it. The scale consisted of 19 self-rated items pertained to seven distinct 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.

PSQI's global scores were 21. The assessment was carried out using scoring system that ranged from 0 to 3 in which a 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 and Reliability

Five psychiatric mental health nursing specialists assessed the scales' validity. The researcher translated the scales' statements and then reviewed them by the five experts. The scales' statements were scrutinized for comprehensiveness, item sequencing, clarity, relevance, format, applicability, and length. Minor changes have been done such as rephrasing of certain sentences based on the suggestions of experts. Internal consistency of BAI and PSQI was estimated through the application of Cronbach's alpha coefficients test and resulted in values of 0.92 & 0.90, respectively that means excellent reliability.

Pilot study

As a means of assessing study's tools regarding their clarity, applicability, and time needed to complete them, a pilot study was performed on exactly 10% (6 participants) of entire sample size. The outcomes of the pilot study had been utilized in order to validate the outlined statistical and data analysis techniques. The instruments were successfully finished without any troubles, supporting the equipment's validity. This research included patients who took part in the pilot study as a part of its overall sample

Ethical Considerations

Minia University Faculty of Nursing's research ethical committee provided the researcher a written initial primary approval. The patients were given a detailed explanation of the study's purpose, nature, and then asked to provide written informed consent in order to gain their acceptance and cooperation. Patients were being notified that their involvement in the research was 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.

Field Work

The intended training program was executed in the following stages

1. Assessment phase

The aim of this stage was to evaluate anxiety and sleep quality levels among HD patients. Every participant was personally interviewed to gather essential information, after thoroughly informing them about the purpose and objectives of the research.

2. Preparatory phase

This stage involved the program approach, sufficient time required, total number of sessions, appropriate teaching methods and media that utilized. The study comprised of seven sessions, with a frequency of two sessions per week, lasting between 60 to 90 minutes per session. Additionally, the training program was carried out within about 10 months through utilizing a range of teaching strategies as videos, pictures, brochure, lecture, feedback, discussion and modeling.

3. Implementation phase
Participants who were taking part in this research were sorted into 10 subgroups after filling out the study tools, with 6 patients in each subgroup.

The training sessions involved the following
Session 1: Introduction about the research (goal, session's duration and content).

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

Session 3: Brief introduction about anxiety and sleep quality.

Session 4: Practicing deep breathing exercise.

Session 5: Brief introduction about progressive muscle relaxation technique.

Session 6: Practicing progressive muscle relaxation technique.
The respondents were provided guidance by the researcher on the implementation of relaxation techniques utilizing PMR. In order to ensure patient comfort and proper technique, patients assume a relaxed position prior to performing a deep breathing exercise. The exercise itself involved the inhalation of air through the nose, followed by the controlled exhalation of air through the mouth. Patients ought to receive guidance on the proper method of contract and relax a particular set of muscles sequentially, beginning from those in the feet, calves, thigh, abdomen, back, hands, biceps, forearms, shoulders, neck and face. Muscles undergo a contraction phase lasting 5-10 seconds, followed by a period of relaxation that also spans 5-10 seconds. Concurrently, it is important for the patient to concentrate on the sensations they feel subsequent to the relaxation of their muscles. The focus of the patient was on developing the ability to distinguish between the sensations of muscle contraction and muscle relaxation. Typically, this technique was executed within a timeframe 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 CD, an educational brochure was given to them. They were been asked to do the practice at home twice a day for one month (two times a day; once in the daytime and once before bedtime). The researcher's phone number was given to the patients to call the researcher for resolving the potential problems related to performance of the PMR.

4. Evaluation phase
The patients' anxiety levels and quality of sleep were assessed using the same evaluation tools on three different occasions; firstly, (Prior to the execution of the program); secondly, one month after execution of the program); and thirdly, (three months after executing of the program).

Statistical Analysis
The data gathered was organized into tables and analyzed using SPSS (version 28). The analysis involved using various statistical measures such as percentages, means and standard deviation. Besides, Chi-square test was being utilized to determine the significance of results conducted before, immediately and post PMR. Friedman test investigated the mean differences between pre, immediate and posttests of total anxiety and PSQI scores. Also, Wilcoxon test investigated mean differences between total anxiety / Pittsburg Sleeping Quality Index scores and socio-demographic data. In addition, spearman correlation test used between the total PSQI scores and total anxiety score pre, immediate and posttests of PMR technique.

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	32	53.3
University	13	21.7
Occupation		
Employed	16	26.7
Not Employed	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 study. Concerning age, 61.7% of patients their age involved a range from 50-65 years with mean age 48±5.4 years. Also, 76.7% of the hemodialysis patients were married and 53.3% of them had secondary education. In addition, 73.3% of the studied patients were unemployed and 76.7%, their family income was not enough.

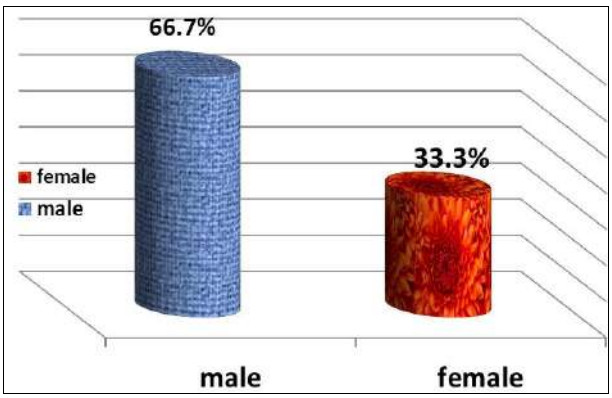

Fig 1: Frequency distribution of the studied patients according to their gender (N = 60)

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

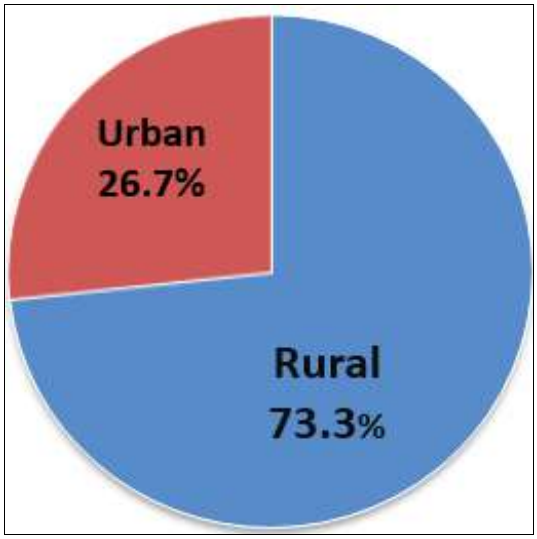

Fig 2: Frequency distribution of the studied patients according to their residence (N = 60)

Figure (2) demonstrates that 73.3% of HD patients came from rural areas while 26.7% of them came from urban areas.

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 pertinent to 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 during the hemodialysis sessions 96.7%, 98.3% & 93.3% suffered from headache, exhaustion and muscle cramp, respectively.

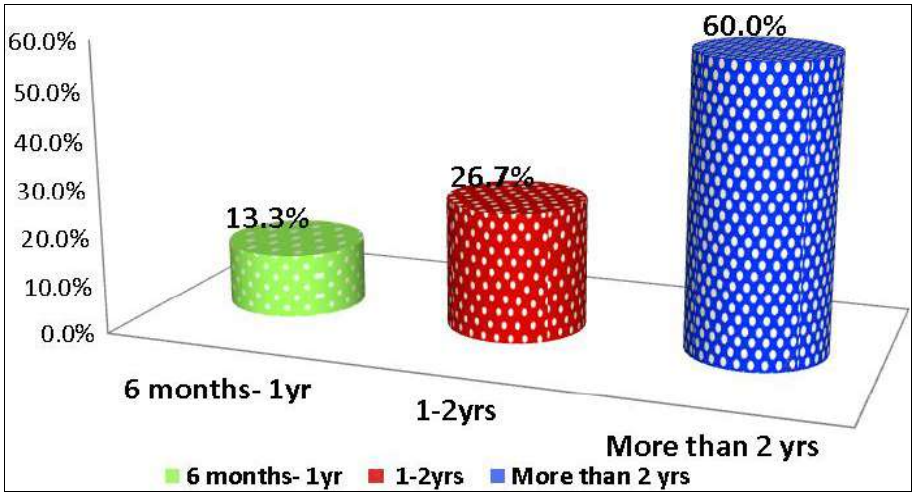

Fig 3: Frequency distribution of the studied patients according to history of disease (N=60)

Figure (3): indicates that, 60% of 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.

Table 3: Comparison between pre, immediate, post progressive muscle relaxation technique regarding total level of Beck anxiety inventory scale among studied patients (N = 60).

Total anxiety level	Pre		Immediate		Post		X 2/ F□	*P*-value
	No.	%	No.	%	No.	%		
Mild	7	11.6	42	70.0	30	50.0	61.03	<0.001**
Moderate	43	71.7	18	30.0	29	48.3		
Severe	10	16.7	0	0.0	1	1.7		
Mean ± SD	32.3±6.5		21.0±4.2		24.1±5.3		180	<0.001**

** Highly significant, Friedman test

Table (3) demonstrates that the mean score of total anxiety before implementation of the PMR technique was 32.3±6.5 decreased to 21.0±4.2 immediately after implementation of the technique. While the mean score of total anxiety level was 24.1±5.3 at the post test. Besides, a highly statistical significant difference was noticed in anxiety levels pre, immediate, and post progressive muscle relaxation (P-value <0.001**).

Table 4: 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		48.66	< 0.001**

** Statistically significant differences at 0.01, □ Friedman test
PSQI = Pittsburgh Sleep Quality Index

Table (4) analyzes that the mean score of total PSQI level before implementation of PMR was 14.3±4.2 decreased to 7.6±5.0 at the immediately test. Meanwhile the mean score of total PSQI level at the posttest was 8.2±4.7. Furthermore, a highly statistical significant difference was observed at the pre, immediate and post PMR among HD patients regarding their PSQI with P-value <0.001**.

Table 5: Relation between total anxiety 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	29.5±0.7	55	0.523	27.0±2.8	60	0.000**	30±. 000	60	0.000**
30-39	29.3±9.6			21.5±3.04			23.1±5.04		
40-49	32.1±7.1			23.4±4.8			23.7±5.5		
50-65	33.0±5.8			22.4±4.1			24±5.3		
Gender									
Male	32.0±6.5	-1.055	0.354	22.05±3.5	-1.64	0.101	23.9±5.3	-.372	0.710
Female	32.7±6.6			24±5.1			24.4±5.2		
Residence									
Urban	28.5±6.0	-2.358	0.354	20.9±2.6	-2.28	.022*	21.8±3.3	-2.015	0.044*
Rural	33.6±6.2			23.3±4.5			24.9±5.6		
Marital status									
Single	28.0±6.2	1.98	0.245	22.6±3.6	. .140	0.000**	23.5±5.04	084	0.000**
Married	32.7±6.2			22.2±3.8			23.9±5.3		
Widower	32.9±7.9			25.1±5.9			25.5±5.5		
Educational level									
Illiterate	34.0±3.8	5.94	0.096	24.4±6.5	2.5	0.000**	23.7±5	1.5	0.000**
Basic education	37.0±7.6			24.2±4.7			25.2±6.1		
Secondary education	31.4±6.5			22.5±4			24.5±5.6		
University education	30.5±6.1			21±2			22.3±3.8		
Occupation									
Employed	29.0±6.6	-2.711	0.009**	21.6±3.4	-1.29	0.197	23.3±5	-.691	0.489
Unemployed	33.4±6.2			23.1±4.4			24.3±5.4		
Family income									
Enough	27.1±6.2	-3.203	0.001**	21.6±3.3	-.450	0.653	23.4±4.9	-.168-	0.867
Not enough	33.8±5.8			23±4.4			24.2±5.4		

*Statistically significant at p=<0.05; ** statistically significant differences at 0.01, Friedman test

Table (5) clarifies that a statistical significant differences had been found between the mean score of total anxiety with occupation and family income at the pretest as p-value (0.009** & 0.001**), respectively. Also, a statistical significant differences had been found between the mean score of total anxiety with age, marital status and educational level at the immediate & posttests as p-value = 0.000**, respectively. Besides, a statistical significant differences had been found between the mean score of total anxiety and residence at the immediate & posttests as p - value =.022* & 0.044*, respectively.

Table 6: 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	13.9±4.6			7.7±4.7			8.5±4.6		
University	13.2±4.6			6.1±3.8			6.1±3.3		
Occupation									
Employed	12.6±4.7	-2.113	0.05*	6.9±4.2	-0.146	0.884	7.9±4.1	-0.196	0.845
Unemployed	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 (6) presents that a statistical significant differences had been detected between the total PSQI mean score with age, residence, marital status, occupation and family income at the pretest with p - value =.014* &.001**&.013* &.05* &.001**, respectively. While at the immediate and posttests, a statistical significant differences had been noticed between the total PSQI mean score age, marital status and educational level with p - value =.001**.

Table 7: Correlation between the global PSQI scores and total anxiety score pre, immediate, post progressive muscle relaxation technique (N = 60).

			Pre	Immediate	Post
			Total anxiety score	Total anxiety score	Total anxiety score
Pre	Global PSQI scores	r	0.455		
		P - value	0.001**		
Immediate	Global PSQI scores	r		0.675	
		P - value		0.001**	
Post	Global PSQI scores	r			0.640
		P - value			0.001**

**Spearman correlation at 0.01

Table (7) illustrates that a statistical significant positive correlation had been detected between the global PSQI scores and total anxiety score at the pre, immediate and post training program as r = 0.455, *p*<.001**, r =.675, *p*<.001**, r =.640, *p*<.001**, respectively.

Discussion

Sleep problems and mental health issues such as anxiety, are frequently occurring in individuals with chronic kidney disease. Although these disorders are common and significant, they often remain unnoticed since not all hemodialysis patients exhibit obvious and explicit symptoms [26]. Therefore, the current study's aim was to evaluate the effect of PMR technique on anxiety and sleep quality among HD patients.

Regarding age, this research proved that over half of HD patients were between the age ranges of 50 - 65 years, with a mean age of 48±5.4 years. This finding was concordant with the literatures which indicated that CRF was a prevalent clinical issue observed among elderly individuals, which was often linked to a higher likelihood of morbidity and mortality. As well as increasing age would affect the anatomy, physiology and cytology of the kidneys. This finding was reinforced by an Egyptian research study performed by Sayed & Younis [27] who investigated the influence of relaxation methods on sleep quality in patients receiving HD.; the authors reported that over 50% of HD patients were above the age of 50, with mean age being 46.80±10.03. Similarly, a research conducted by Mohammed *et al*., [28] from Egypt for evaluating the contributors to sleep interruption and providing

recommendations for patients undergoing HD; they documented that approximately 50% of the participants analyzed were from 50-60 years, with a mean age of 45.97±9.57.

Concerning marital status, this study suggested that a high percentage of individuals with HD were in a married state. Most likely, the reason behind this could be attributed to a significant number of patients fell within the age bracket of 50-65 years, with their mean age being in the intermediate stage. Besides, active seeking out medical advice was observed to be more prevalent among married individuals, attributed to their increased obligations and concerns surrounding the potential diminished of their ability to fulfill their duties due to illnesses or disabilities. This outcome was parallel to the research's result of Ahmed *et al*., [29] conducted in Egypt for measuring the prevalence and etiology of CRF for patients on maintenance HD; the finding showed that most of the participants were married.

With regards to education, the present research demonstrated that greater than half of the subjects analyzed had completed secondary level of education. This finding could be referred to over two thirds of HD patients were males. Along with Egypt profile, females are more vulnerable for illiteracy as almost 25% of Egyptian females were illiterate compared to 14% among the males. In addition, the likelihood of a female to not have any education is almost double that of a male [30]. This outcome was consistent with Aziz *et al*.,[31] who proved that over one third of studied subjects had secondary level of education. Further study results were in harmony with the current study revealed by Todorova and Hristova [32] who recorded that 50% of the participants obtained secondary level of education.

According to the studied patients' occupation, it was discovered that above two thirds of HD patients were found not working. This outcome may be the consequence of a number of influences, including insufficient employment opportunities, level of education or an inability to work. In addition, the highest percent of HD patients' age ranges were 50-65 years which leading to retirement. Also, the weekly session schedule can also have an impact on patients' ability to attend work. The current outcome was compliant with a research executed by Kamel *et al*., [33] in Egypt to evaluate levels of anxiety and depression among individuals suffering from HD; the researchers found that 50% of cases were not working.

Moreover, the present research results demonstrated that, the highest percent of HD patients experienced inadequate family income. This outcome could be attributed to unemployment. On the other hand, HD patients suffer from variety of chronic diseases that represent a financial burden for them. The findings were congruent with a research performed by Elsayed *et al*., [34] in Egypt to investigate the influence of relaxation techniques on the levels of anxiety, depression, and sleep quality among individuals receiving HD treatment; the authors proved that most of respondents' family income was not enough.

With respect to gender, the present research disclosed that above two-thirds of HD patients were males. This finding could be attributed to the likelihood of commencing dialysis was greater among males compared to females. Besides, worldwide, kidney replacement therapy is more commonly provided to men than women, possibly due to biological factors and the accelerated development of chronic kidney disease in men. The current result was similar to Liu *et al*., [35] and Lima *et al*., [36] who noticed that 50% of respondents were males.

Pertaining to residence, the current research results proved that approximately three quarters of the participants originated from rural regions. The present finding could be resulted from the occurrence of CRF in rural communities is higher among countries with moderate to limited levels of income. Additionally, the occurrence of abnormal kidney function was high in rural population which associated with the presence of high blood pressure and blood glucose levels disorders that are often unrecognized and rarely controlled in this population [37].

The current outcome was in alignment with the research carried out by Aziz *et al*., [31] in Egypt, who documented that approximately two thirds of patients in the research were from rural regions. Similarly, research conducted by Elbadawy *et al*., [38] in Egypt, to determine the prevalence of common intestinal parasites under maintenance HD in Benha University; they found that above two thirds of the respondents resided in rural regions.

Regarding medical data of patients studied, the present research demonstrated that a vast majority of such individuals were experiencing muscle pain and muscle cramp. This outcome might be rationalized as a disturbance in fluid or mineral balance. The current findings were reinforced by Flythe *et al*., [39]; the authors mentioned that muscle pain and muscle cramp were the most commonly experienced physical symptoms among HD patients. On the same respect, Bhuvaneswari *et al*., [40] proved that a high percentage of patients with HD suffered from intense muscle cramps and muscle pain.

The current research highlighted that the highest percent of HD patients suffered from headache. The finding indicated that headache was a prevalent neurological symptom and frequently reported amongst HD patients which could be due to changes in electrolytes during dialysis, hypertension and being anxious or stressed. These results were reinforced by Hazim *et al*., [41] who documented that 50% of participants had headache.

Moreover, the findings of the present research indicated that most of the participants experienced exhaustion. HD patients' exhaustion might be caused by a variety of reasons, including inadequate nutrition, negative medication effects and duration of HD session. The study result was compatible with the Egyptian study result held by Hamed and Aziz [42] to test the impact of practicing deep breathing exercises on level of exhaustion among patients on HD treatment; the outcomes of the study illustrated that 67% of HD patients were extremely exhausted.

According to history of disease, the current research findings discovered that above half of patients had been receiving HD for more than 2 yrs. This result reflected the importance of HD treatment modality for survival. Although the typical lifespan for dialysis patients was 5-10 years, some patients thrived on the treatment for as long as 20 or even 30 years. Likewise, Aziz *et al*., [31] reinforced the current findings; they proved that 65% of participants started renal dialysis since 3 years and more. Unlike the results of Purba *et al*., [12] who discovered that 30% of individuals were on HD for less than one year.

With regard to the total anxiety mean score at pre, immediate and post training program, the current research findings displayed that the total anxiety mean score prior to

the training program was elevated while decreased at the immediate and posttests. These findings could be interpreted by regular application of PMR interventions that result in a favorable effect in reducing levels of anxiety by lowering biological stress levels. Other more contemporary explanations asserted that PMR yields cognitive enhancements in patients by engendering a heightened sense of control and promoting novel ways of thinking through the relaxation method. Undoubtedly, patients who master the art of relaxing their muscles also gain the ability to regulate their thoughts, emotions, and physical sensations associated with anxiety [43].

The present outcomes were compatible with Muchtar *et al*., [5] the authors displayed that anxiety of patients with CRF undergoing HD decreased significantly after PMR intervention with highly significant difference. Also, the current study findings were reinforced with a research performed by Murtadho *et al*., [16] who noticed that the anxiety level's mean score before and after the PMR program was 28.76±4.603 and 16.61±2.487, respectively, with a significant difference.

Additionally, the outcomes of current research indicated a marked statistically significant difference in anxiety levels amongst studied patients, as observed in the pre, immediate and post training program. These findings might confirm the PMR technique's efficacy in lowering anxiety levels in HD patients. The technique can help the patient to relax all the muscles, concentrates and thus overcoming a spectrum of physiological and psychological manifestations encompassing symptoms such as being anxious and stressed. These findings were in harmony with a research outcomes achieved by Hudiyawati *et al*.,[44] who found a remarkable statistical relevant association between the total level of anxiety before and after application of PMR technique where the P-value was 0.05*.

Concerning the total PSQI mean score, the present research results highlighted that the PSQI mean score was elevated before implementing PMR while decreased at the immediately and posttests. Furthermore, highly statistical significant difference was observed between pre, immediate and post PMR intervention among HD patients regarding their PSQI level.

PMR's efficiency in enhancing sleep quality was attributed to a number of mechanisms; PMR has the potential to produce a relaxation response by means of diversion of attention and a discernible reduction in systemic tension, as well as relaxation of the musculature. In addition to that, the technique creates profound relaxation by lowering the level of electrical activity within specific regions of the brain including the superior frontal gyrus, posterior cingulate cortex and inferior frontal gyrus,; such a reduction in activity has been shown to alleviate symptoms commonly associated with sleep disturbance [45].The present outcomes of this research were in harmony with the results of Elsayed Rady *et al*.,[19] the authors 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**).

Regarding the relation between personal data and total anxiety mean score, it was clarified that a statistical significant differences between the patients, global anxiety mean score with their occupation and family income were observed at the pretest. The present evidence posits that the observed outcome may be attributable to the ramifications of CRF on the patients' physical condition, manifesting in debilitating bone pain and widespread somatic distress that impairs occupational functioning. that greatly reflected on family income and significantly increased anxiety in the studied patients. This finding was partially agreed with the findings of Aryal *et al*., [46] the authors clarified that statistical significant differences between anxiety and occupation were noticed at the pretest.

Conversely, the current research result was inconsistent with Astuti *et al*., [15] the researchers stated that no statistical significant differences between anxiety and occupation were noticed at the pretest. Also, the current research result was partially confirmed with the outcomes of a study which performed in Egypt by Kamel *et al*., [33] to assess anxiety and depression among HD patients; the researchers had proved that statistical significant differences were noticed between anxiety and family income at p - value =.05 whereas no statistical significant differences were observed between anxiety and occupation.

Moreover, the present research assured that, statistical significant differences were noticed between the global anxiety mean score with age, marital status and educational level at the immediate and posttests. Additionally, statistical significant differences were found between the overall anxiety mean score and residence at the immediate and posttests. These findings may be attributable to the fact that anxiety and worry were among the major factors significantly in the elderly patients with CRF that decreased after PMR utilization. In addition, the present findings might be contributed to PMR technique was simple and easily learnable technique that can be mastered by individuals, irrespective of their age, marital status, place of residence, or educational degree. The current findings were disagreed with Astuti *et al*., [15] the researchers reported that, no statistical association was observed between demographic data and anxiety for the intervention group.

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 with age, residence, marital status, occupation and family income at the pretest. These findings assured that advanced age, rural, economic problems, married and unemployed persons were important risk indicators for sleep disturbances among HD patients. The heightened likelihood of sleep disturbances among older individuals can be attributed to a slightly compromised sleep regulation mechanism, coupled with the prevalence of comorbidities that also play a significant role in exacerbating sleep disorders in the elderly population. 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, with Valero *et al*., [47] their findings suggest that poor sleep quality is a common phenomenon among elderly individuals. Moreover, socio-cultural influences that can raise stress levels and negatively impact HD patients' sleep quality include economic problems, marital status and unemployment. Similarly, Rosdiana and Cahyati, [48] stated that unemployment, marital status and economic problems are important factors that can affect insomnia. Besides, the current results were compatible with study's outcomes of Elsayed *et al*., [34] they illustrated that high statistical

differences were detected between the total PSQI mean score of respondents with their age, residence, marital status, occupation and family income at p - value = 0.001**. Furthermore, the present findings discovered that statistical significant differences were observed between the global PSQI mean score age, marital status and level of educational at the immediate and posttests. The present findings reflected that in advanced age, being married and educated HD, patients, a global PSQI score was lowered with good sleep quality. The possible reasons might involve subjects' adherence to the researchers' guidance and their perception of PMR remedies as an integral component in managing their sleep disorders. The present finding was partially in the line with Sayed and Younis [27] who found that statistical significant differences were noticed between the overall PSQI mean score and level of educational after training program at p - value = 0.0001**, while no statistical significant differences were identified with marital status and age.

With regard to the correlation between the global PSQI and anxiety scores, the current findings illustrated that statistically significant positive correlation was noticed between the global PSQI and anxiety scores at the pre, immediate and post PMR. These outcomes could be interpreted by PMR program caused significant relief of anxiety symptoms as well as an enhancement in sleep quality among individuals diagnosed with HD. In addition, PMR practicing represents an intervention strategy with low-cost and low-risk attributes. Interestingly, this therapeutic approach has been met with high acceptability by the patients, indicating promising potential for its promotion and integration within clinical practices. The present study findings were compatible with a research performed by Yang *et al*., [49] the researchers displayed a significant correlation before and after PMR therapy between anxiety and sleep quality among HD patients.

Conclusions

The present research findings concluded that the mean scores of total anxiety and PSQI decreased immediately and post implementation of PMR technique. Also, a positive correlation was noticed between the global PSQI and anxiety score at the pre, immediate and post training program. It was also concluded that PMR technique effectively diminishes anxiety and improves sleep quality among HD patients.

Recommendations

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

A specialized training program should be applied for nephrology nurses to equip them with adequate knowledge and skills that facilitating integration of PMR technique into their regular care routine for mitigating the emotional influences and reliance on pharmacological remedies.

Booster sessions could be conducted on intermittent periods after the first intervention to boost the long term effect of the training program.

Organizing seminars that aim to enhance the knowledge of nurses on the psychological issues faced by HD patients and provide them with effective therapeutic techniques to cope with these concerns.

Future studies should be done to detect therapeutic interventions and strategies to improve psychological status for HD patients.

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