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Efficacy Of Exercise Program In Intra HemodialysisOnpatients'Quality Of Life

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Abstract*: Patients with ESRD have lower physical activities, muscle performance, and quality of life (QOL) than do healthy subjects. Numerous studies have suggested that exercise could improve many indicators of physical functioning, improve self-reported physical functioning, and also improve QOL in ESRD patients.**Aim of the study:** To evaluate the Efficacy of Exercise Programs in intra Hemodialysis on Patients' Quality of life. **Design:** Pre-Post test control trial design was conducted. **Subjects and Methods. Setting:** This study was conducted at Hemodialysis Unit, Talaba, TantaUniversity Hospital.**Subjects:**The sample comprised from all available 60 patients.Three tools were used for data collection they accomplished after reviewing the recent relevant literatures. Tool (I): Socio-demographic and medical clinical base line data collection of baseline data regarding hemodialysis. It was comprised of four parts: Part I: Socio-demographic. Part 2: Laboratory investigation. Part 3: characteristic of dialysis, Part 4: Health problem on body systems. Tool (II): Short form Health Survey (SF-36),Tool (III): Fatigue was measured using the multidimensional fatigue inventory (MFI). Study was extended fromJanuary 2015 to the end of December 2015**. Result:** It was found that, there were significant differences and improvement in studied patients of all domains of QOL scores,P (0. 00*). It is noticed that the domain with the lowest score in the pre and post-tests was that of the work status. Also the indicates weak to strong statistically significant positive correlations in all domains of SF36. On the other hand, the domain ofhealth limit in activities, vigorous activities, feel during the past 4 weeks, and a very nervous person have the highest scores both at the pre and posttests**.Conclusion and Recommendations:**Based on the findings of the presented study, it can be concluded that. exercise program intra hemodialysis showed improvement in patients quality of life and decrease fatigue , also improve patient outcomes.Theoptimal recommendations of exercise for patients with renal failure during hemodialysis should be done.*

Key words*: End Stage Renal Disease, Hemodialysis, Exercise.*

I. Introduction

Today end-stage renal disease (ESRD) is still major health concern. ESRD, the deterioration of nephrons to an advanced stage resulting in the dysfunction of the kidneys for a long period requires either dialysis treatment or transplantation in advance. ESRD results in a negative clinical status, which in turn results in both structural and functional changes in the musculoskeletal system. Consequently, the patient is faced with a sedentary life, making the patient even further dependent. Low functional capacity, exhaustion fatigue and under nutrition was found to be prevalent among incident dialysis patients. Complications such as uremia, anemia, myopathy, and neuropathy decrease muscular strength, cardio-pulmonary fitness, and quality of life, which is why this population is seen[(1,2)].

Hemodialysis is one of the main renal replacement therapies in patients with ESRD, is a time-consuming procedure that takes at least 3 to 5 hours a day, two or three times a week. Even though there are many debates about the beneficial effects of exercise during hemodialysis (intradialytic exercise) many researchers expect advantages of both dialysis and exercise via intradialytic exercise[(3)]. Therefore, various exercise programs, such as aerobicexercise, resistance exercise, combined aerobic and resistance exercise and passive exercise have been developed for hemodialysis patients [(4)].

Hemodialysis (HD) patients' quality of life (QOL) is significantly impaired in comparison to the healthy people, and those who have received a renal transplant. This is often attributed to high levels of fatigue, which encompasses physical and mental exhaustion, reduced motivation and reduced activity[(5)]. Despite patients commonly having poor exercise tolerance, some form of exercise is believed to improve physical and mental functioning in dialysis patients and thereby enhance their QOL[(6)]. Hemodialysis patients are significantly less active than healthy, sedentary individuals and a low intrinsic motivation has been identified as a major barrier to prescribing exercise. Regular physical activity is associated with enhanced health and wellbeing[(7)].

Numerous studies have suggested that exercise-based rehabilitation programs could improve physical functioning and QOL in ESRD patients [8, 9]. Exercise interventions during hemodialysis sessions while patients are connected to machine, i.e., intradialytic exercises, have become more and more popular as they are superior to interdialytic exercise programs (between two hemodialysis sessions when patients are not connected to machine) in terms of better adherence [10-12]. Intradialytic exercises have been shown to be safe [10], and can be safely performed in the first 2 hours of dialysis without cardiac decompensation[9].A recent review summarizes the potential health benefits of intradialytic exercise programs for hemodialysis patients. However, it is difficult to incorporate intradialytic exercise (e.g., cycle ergometer, bicycle training, resistance exercise) due to requirement of additional equipment, space, and personnel besides those for routine hemodialysis [9].

Exercise training may have positive benefits on other factors that are important clinical issues in dialysis patients, including oxidative stress, cardiovascular risk profile and inflammation [9]. **Kutner et al., (2010)**, reported that screening and management of depressive symptoms and support for increased activity level may facilitate patients' opportunity for continued employment after initiation of dialysis and improving their quality of life [10].

Several of the known benefits of exercise or regular physical activity in the general population are related to areas of specific concern to patients with ESRD, such as reduced risk for cardiovascular mortality, improvement in blood pressure (BP) control among hypertensive individuals, better control of diabetes, and improvement in health-related quality of life as a result of enhanced psychological well-being and improved physical functioning [13].Exercise is a physical activity defined as a planned, structured, and repetitive bodily movement done to improve mental and physical functioning and quality of life. The barriers faced by patients on maintenance hemodialysis therapy include fatigue, decreased motivation and the inability to schedule exercise around daily activities and dialysis schedules[14].

Quoted, **White &Grenyer (2006)**, reported that exercise has been established as a vital part of health improvement activities for all, especially those on dialysis therapy. Short term exercise programs show varying results depending on the extent of fatigue, quality of life, and the burden of the disease [15]. Fortunately, exercise training is beneficial for hemodialysis patients, but the benefits vary depending on the patient's abilities and willingness to participate [16].

Intradialytic exercise is safe, effective, and underutilized. It is well documented that dialysis patients have low levels of physical functioning and a high incidence of depression. In addition, dialysis patients complain of fatigue and rate their health as poor[17]. A comparison of dialysis patients with matched controls showed that dialysis patients had a 45% lower peak aerobic exercise capacity [18].

Physical activity helps dialysis patients to improve their well-being [19]. The association of decreasing levels of leisure-time physical activity with increased mortality risk is less certain in ESRD patients than in the general population[20]. It is therefore plausible that exercise may also lead to a corresponding decrease in morbidity and mortalityrates in individuals with ESRD. An intervention with such an effect would be welcomed in the ESRD population, which is known to have high mortality rates and burden of cardiovascular disease [21].

The positive impact of dialysis exercise programmers on people's physical functions was recently demonstrated [22]. **Parson et al,(2004),**reported that exercises during dialysis enhanced dialysate urea removal but not serum urea clearance. Alterations in the timing of exercise during dialysis and modality may be required to elicit increases in serum urea clearance. It is recommended that mild exercise during dialysis should be performed during the first two hours of dialysis [23].

Also, **Bennet et al.,(2012)**, proposed the formula to determine the Dialysis Exercise Adequacy (DEA) that takes into account the frequency (F) and duration (T) of the exercise in hours and the age (A) of the person in years; thus DEA=FTA/100. A minimum DEA "target" could be established (for example 1.0) that considers the amount and frequency of exercise relative to the age of the person[24]. Few studies have measured the acute or long-term effects of intradialytic exercise on urea removal and dialysis efficacy in vivo. In response to a single bout of exercise, dialysis efficacy has been shown to increase between 15% and 25% [25, 26].Training of exercise during dialysis treatments may improve solute removal by increasing blood flow to muscle and efflux of urea and other toxins into the vascular compartment where they can be removed [27]. Moreover there is a possibility of reduced exercise tolerance during dialysis resulting from electrolyte and fluid shifts and exercise could lead to dialysis-associated hypotension [28].It appears, however, that exercise is generally well tolerated within the first 1-2 hours of a hemodialysis (HD) session [29].

Quoted, **Goldberg et al., (1980)**, examined the metabolic effects of exercise training in hemodialysis patients and reported that training lowered triglycerides and increased High Density Lipoprotein HDL cholesterol[30]. Numerous studies in both the general and dialysis population lend circumstantial evidence and point to plausible physiological mechanisms for a morbidity and survival benefit with improved physical fitness and function and increasing physical activity levels in patients with ESRD [31]. The exercise increases the insulin sensitivity in the skeletal muscle and decreases the insulin in the blood which suggests less adiposities andhealthy lipid profile with increased High Density Lipoprotein HDL-cholesterol and decreased triglycerides.

Due to this, testosterone levels have been found to increase and androgen receptors which increase the effect of testosterone [32- 34].

Also, **Segura (2010)**, reported that moderate evidence exists on the improvement on capacity of exercise on aerobic training, combined or isolated with strength training. Strength training improves health related quality of life and has positive effect on functional capacity and improves lower limb strength [35]. Although advances in dialysis techniques and control of comorbid diseases have extended the lifespan of HD patients, these individuals continue to experience significant impairment of quality of life (QOL). The reduced QOL experienced by this cohort may be attributed to: (1) physiological alterations in the internal milieu secondary to ESRD, (2) comorbidities, (3) biological aging, (4) lifestyle restrictions and sedentary behavior imposed by 12 to 18 h/wk. of maintenance HD treatment, and (5) loss of psychological and functional health status as a direct consequence of factors 1 through 4[36].

In dialysis patients, both aerobic (endurance) exercise and resistance exercise have demonstrable effects. A comprehensive tabulation of such studies, including the type of exercise, the timing relative to the dialysis session and the resulting effects on physiological function, has been published[37].Intradialytic aerobic exercise leads to a significant increase in aerobic exercise capacity and duration of exercise [38]. Generally, patients with ESRD have lower physical activities, muscle performance, and quality of life (QOL) than do healthy subjects. Numerous studies have suggested that exercise could improve many indicators of physical functioning, improve self-reported physical functioning, and also improve QOL in ESRD patients [39]. In addition, in a randomized controlled trial, exercise was shown to improve some indicators of risk of sudden cardiac death [40].Therefore, thisstudy was conducted to evaluate the effect of exercise program in intra Hemodialysis and Patients outcomes.

Aim of the study:

To evaluate the Efficacy of Exercise Programs in intra Hemodialysis on Patients' Quality of life.

II. Subjects And Methods

Research hypothesis

1- Providing exercise program in intra hemodialysis will improve patient well beings.

2- Patients receive exercise program intra hemodialysis willimprove quality of life,patients outcome and decrease fatigue.

Operational definition

Patient outcomes: The physical fitness and physical functioning = the ability and capacity to perform activities of daily living.

Researchdesign: Thepresent study was utilized A pre post test control trial **.**

Setting:

This study was conducted at Hemodialysis Unit, Talaba, Tanta University Hospital.Which receives patients have renal failure, and transferred from all hospital departments which include medical, emergency or out patients with health assurance card scheduled for hemodialysis. It consists of 18 hemodialysis machine.

Subjects: The sample comprised from all available 60 patientsattending the hemodialysis unit of Talaba, Tanta University Hospital, during the study periodwere recruited in the study with the following inclusion andexclusion criteria.

Inclusion criteria: Age greater than 18 and less than 85years, both sexes, on maintenance hemodialysis therapy for atleast three-months and willing to participate in the study andattend all programs.

Exclusioncriteria: Subjects will be excluded if they hadrecent myocardial infarction, uncontrolled hypertension, unstable angina, severe uncontrolled diabetes, symptomatic left ventricular fibrillation, neurological or cognitive disorders with functional deficits, musculoskeletal problems, lower limb amputation,lumbar disk, osteoarthritis, cognitive impairment, arterial veins shunt from femoral artery,dialysis by use of a femoral artery catheter or jugular vein catheter, active liver disease, arterial blood pressure (BP) ≥ 220/110 mm Hg or ≤ 100/60 mm Hg.

Tools of data collection:

Threetools were used for data collection they accomplished after reviewing the recent relevant literatures [10-17] .

Tool (I): Socio-demographic and medical clinical base line data.

This tool was developed by the researchers after reviewing of relevant literature [10-17] for collection of baseline data regarding hemodialysis. It was comprised of four parts:

-Part I: Socio-demographic.

It revealed data about the following items: patient's: code, age, sex, marital status, level of education, occupation, income/ month, family numbers, smoking status, height, weight, dry weight,body mass index**.**

-Part 2: Laboratory investigation.
It included Hemoglobin, serum creatinine, serum urea, serum potassium, serum albumin.
- Part 3: characteristic of dialysis.
This included the dialysis modality, frequency of dialysis per week, prescribed dialysis time, years of dialysis, primary cause of renal failure, associated disease, medication, dialysis access, care of shunt.
- Part 4: Health problems on body systems.
These included oral problems, gastrointestinal system, integumentary system, musculoskeletal system, activity daily living,circulatory and respiratory system, neurological system, psychological state.
Tool (II): Short form Health Survey (SF-36):
To measure health related quality of life of patients before and after implementation of exercise program for patient'sintra hemodialysis. It is a self-completed questionnaire covering all aspects of Health Related Quality of Life (HRQOL). It is a valid instrument for measuring HRQOL. The current study utilized the Arabic version of the SF-36 in order to evaluate the HRQOL of the patients. The questionnaire includes multi-item scales to assess the eight dimensions of wellness: physical functioning, role limitations due to physical health problems, bodily pain, general health perceptions, social functioning, vitality, energy or fatigue, and role limitations due to emotional problems. In addition, two summary scores are calculated using these eight scales:

Perceived Self-Efficacy
It is an eight-item scale that is measured by Likert scale ranging from strongly disagree (1) to strongly agree (5) by **Smith et al.,(1999)**[36] is a valid and reliable measure of perceived self-efficacy. It measures the degree of confident of effectively manage health outcomes It was translated to Arabic according to WHO guidelines. Negatively-valences items are reverse scored before summing across all eight items. The scores were below 60% was graded as unsatisfactory and 60% and above was graded as satisfactory.

Tool (III): **Fatigue was measured using the multidimensional fatigue inventory (MFI).**
Multidimensional Fatigue Inventory questionnaire (MFI). The MFI contains 20 statements that are organized into five dimensions of fatigue with four statements each (general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue). The response scale has five choices fromagreement ‘‘yes, that is true’’ to disagreement ‘‘no, that is not true’’. A global fatigue score combining the five results ranges from 20 to 100, with higher scores indicating higher levels of fatigue. The psychometric properties of the MFI have been well documented, and it has been frequently used in oncology and rheumatic diseases.The MFI-20 has a five-point response Likert scale (1- yes that is true through to 5 – no, that is not true) to indicate the degree of agreement to each of the nine statements with higher scores indicating greater fatigue levels.Fatigue was categorized into the following components: general fatigue, physical,reduced motivation and mental. The scale is parsimonious and simple to complete.The MFI-20 has been used across diverse population groups, and has established, reliabilities of 0.86 (group level) to 0.90 (individual variations) **(Smets et al.,1995)**[37].

Method:
1-An official permission to carry out the study was obtained from responsible authorities at Faculty of Nursing at Tanta University. Then, the permission was obtained from the hospital administrative authority.
2-The purpose of the study was explained to the patients and their consent to participate was obtained and those who were willing to participate were given a questionnaire to answer it. They were also assured of their anonymity and the confidentiality of their responses.
3- Study was extended from January 2015 to the end of December 2015.

Field work
4- Tools validity was checked by 5 experts in the related field of medical surgical nursing, community nursing and medical specialty. Tanta University.
5-Reliability (coefficient alpha) was tested for all tools and it was (0.87).
6-Pilot study was conducted on 10% of patients. This number was excluded from the studied sample to identify the obstacles and problems that may be encountered in data collection, applicability and feasibility of the developed tools.
The program was conducted on four phases which include the following:-
1- Program Assessment Phase:
- In this phase all patients were assessed using tool I part 1, 2, 3, 4 and tool II, tool III.
2- Planning phase:
- In this phase planning was formulated for each patient's based on assessment phase and literature review. The general objective of exercise program is to improve patients' quality of life, patient outcome and decrease their fatigue.

3- Implementation phase:

- During this phase, the researcher worked on explaining the exercise program to the patients and distributed picture, video, and booklets containing the physicalfitness steps and details of the exercise program in Arabic with pictures so the process could be easily understood by the patient.

-The researcher collected baseline data using interviewing techniques daily coinciding with the three shifts of work. Three to five patients were interviewed per day. The interview took between 30 and 40 minutes for each patient.

- Prior to the commencement of the exercise program, to determine the patient's baseline fatigue level and fortnightly during the exercise program to determine the impact of exercise on perceived levels of fatigue.

- Once the patients were ready to start the program, researchers collected Health Related Quality of Life (HRQOL)-SF and physical fitness information before the program started.

The exercise program total duration was forty minutes divided into 5 minutes before the session of hemodialysis and 35 minutes during the of hemodialysis session. Exercises included stationary bikes on the bed, Cycling, rubber balls and upper and lower body resistance exercises with dumbbells and sandbags; three times a week, during each hemodialysis session.

- At the beginning of the exercise program, the following variables were analyzed: creatinine, urea, potassium, and hemoglobin, albumin, as well as the efficiency of dialysis, QOL by using the questionnaire "Medical Outcomes Study 36 (SF36) and multidimensional fatigue inventory (MFI).

-First Part– warm-up (approximately 5 minutes) – free active exercises of the lower extremities in the supine position.

- Second Part– the main part (10 to 30 minutes) foot pedal exercise of increasing duration beginning with 15 minutes in the first week, 20 minutes in week 2, and 30 minutes the following and subsequent weeks in a semi-supine position.

The intervention was a program of resistance exercise during HD sessions, 3 times per week for a period of 12 weeks. All participants underwent an individualized tri-weekly intradialytic timed pedal exercise program for 12 weeks. Participants exercise was scheduled within the first two hours of dialysis in order to encourage motivation and prevent hypotension. Duration of the training was gradually prolonged, from 5-7 minutes initially to 30-40 minutes. Training intensity was also gradually increased, however, not earlier than the full-time duration of training session was achieved.

-Third part – cool-down (approximately 5 minutes) – free active exercises of the lower extremities in the supine position and breathing exercises.

The program therefore introduced a continuous. It was assumed that termination of exercises during the training session will take place in the following cases: inability to maintain the recommended rate of pedaling; occurrence of retrosternal, muscle, articular pain; increase of respiration rate above 40/min.; occurrence of nausea, dizziness, muscle cramps; or patient's request(malaise, fatigue).

An 'exercise nurse' familiarwith the proposed trial was allocated to exercising patients on each shift andparticipants were verbally reminded at commencement of dialysis regarding theirexercise program.The program was developed under supervisor and the advice of doctorin Rheumatology and Rehabilitation department. She assisted in the evaluation of physical functioning and in developing the exercises.

- Evaluation phase:

The evaluation of the effectiveness the exercise program was carried out post 3 months using tool I part 2, 3, 4 and tool II& III.

- At the end of the exercise program, the following variables were analyzed: creatinine, urea, potassium, and hemoglobin, albumin , as well as the efficiency of dialysis, QOL by using the questionnaire "Medical Outcomes Study 36 (SF36) and multidimensional fatigue inventory (MFI) .

Statistical analysis:

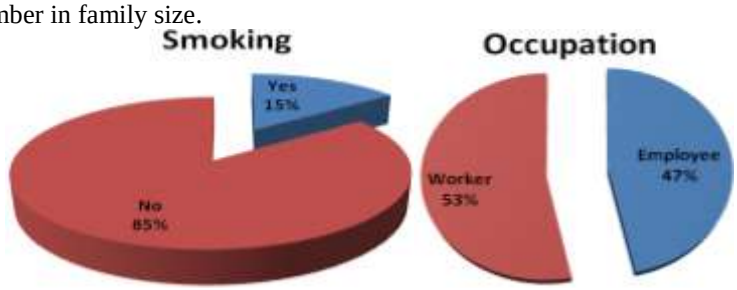
The analysis was performed using statistical software SPSS version 16.For quantitative data, the mean and standard deviation were calculated. For qualitative data, a comparison between one group before and after intervention was done by using Chi-square test (χ^2). For comparison between means of one group before and after intervention, 1-way ANOVA test was used. A significance was adopted at $P<0.05$ for interpretation of results of tests of significance.

IV. Result

Table (1): Distribution of the studied patients according to their socio-demographic data (n=60).

Characteristics		N	%
Age	From 18 to less 25	4	6.7
	From 25 to less 45	10	16.7
	From 45 to less 65	42	70.0
	From 65 and more	4	6.7
Gender	Male	48	80.0
	Female	12	20.0
Marital status	Single	4	6.7
	Married	52	86.7
	Widowed/Divorced	4	6.7
Level of education	Illiterate	8	13.3
	Read &write	30	50.0
	secondary / technical	21	35.0
	University	1	1.7
Income /month	Less than 1000 pound	32	53.3
	1000- 2000 pound	28	46.7
Family numbers	3-4	21	35.0
	5-6	39	65.0

Table (1): Shows distribution of the studied patients according to their socio-demographic data : Regarding the age distribution of the studied patients, it was found that the near three quarter (70%) of studied patients aged from (45-65). Regarding the gender, it was found that male sex (80%). As regarding marital status it was found that the majority 52 (86.7%) of studied patient were married. While regarding the level of education one half of the studied patients 30 (50%) has read and write. As regarding the income it was found that the 53.3% of studied patients have income less than 1000 pound monthly.As regarding family size it was found that (65%) of studied patients have 5- 6 number in family size.



Regarding smoking it was found that the majority of studied patients were nonsmoker's (85%). While regarding the occupation it was found that more than one half were worker (53%).

Figure (1): Distribution of the studied patients according to their height, weight and dry weight (n=60).

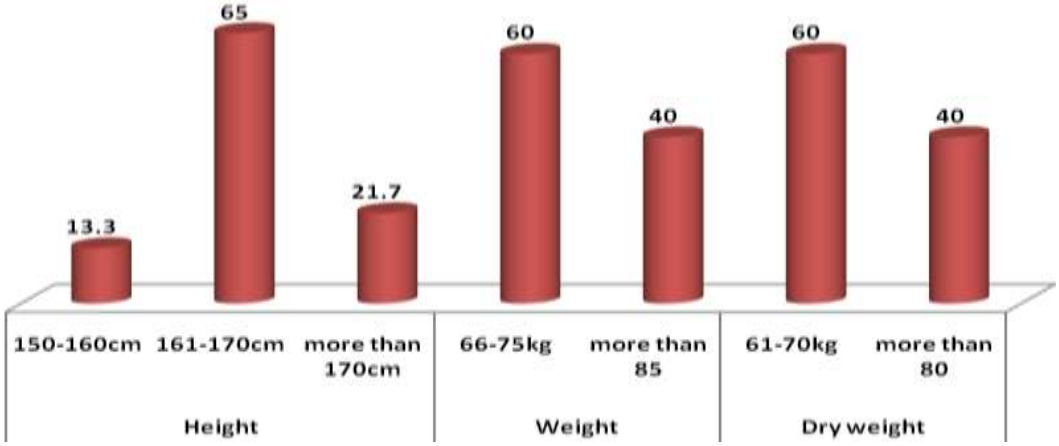


Figure (1): Illustrates distribution of the studied patients according to their height, weight and dry weight. Regarding studied patients height it was found that around two third (65%) were length 161-170 cm. Asregarding weight it was found that 60% of the studied patients weighted from 66-75 kg. Regarding dry weight it was found that 60% of the studied patients dry weighted 61-70 kg.

Table (2): Comparison of laboratory investigations among studied sample with hemodialysis pre and post 3 months intervention.

Investigations		Pre (n=60)		Post 3 months (n=60)		χ^2	P
		N	%	N	%		
Hemoglobin	9-12gm	60	100	27	45.0	**45.517**	**0.00***
	more than 12	0	0	33	55.0		
Serum creatinine	less than 10	0	0	22	36.7	**26.939**	**0.00***
	more than 10	60	100	38	63.3		
Serum urea	less than 100	0	0	22	36.7	**26.939**	**0.00***
	more than 100	60	100	38	63.3		
Serum potassium	normal	16	26.67	45	75.0	**28.041**	**0.00***
	abnormal	44	44	15	25.0		
Serum albumin	normal	16	26.67	42	70.0	**22.558**	**0.00***
	abnormal	44	73.33	18	30.0		

*** Significant at P<0.05.**

Table (2): Shows comparison of laboratory investigations among studied sample with hemodialysis pre and post3 months intervention. Regarding thelaboratory investigation of hemoglobin,serum creatinine, serum urea, serum potassium, and serum albuminthe studied patients pre and after 3months from intervention, there were significant differences and improvement in laboratory investigations P (0. 00*).

Table (3): Characteristics of dialysis among studied sample pre and post 3 months of intervention.

characteristics		Pre (n=60)		Post 3 months (n=60)		χ^2	P
		N	%	N	%		
Years of dialysis	less than one year	7	11.7	7	11.7	**0.00**	**1.00**
	1-5 years	8	13.3	8	13.3		
	>5- 10 years	43	71.7	43	71.7		
	> 10 years	2	3.3	2	3.3		
Primary cause of ESRD	Diabetes mellitus	15	25.0	15	25.0	**0.00**	**1.00**
	Hypertension	9	15.0	9	15.0		
	Glomerulonephritis	19	31.7	19	31.7		
	Polycystic kidney disease	11	18.3	11	18.3		
	Other	6	10.0	6	10.0		
Associated disease	Hypertension	10	16.7	10	16.7	**0.00**	**1.00**
	Diabetes mellitus	15	25.0	15	25.0		
	Other	35	58.3	35	58.3		
Systolic Blood pressure	normal	48	80.0	48	80.0	**0.00**	**1.00**
	Abnormal	12	20.0	12	20.0		
Medication	Antihypertensive	10	16.7	10	16.7	**0.00**	**1.00**
	Others	50	83.3	50	83.3		
Dialysis access	Arterial venous graft	33	55.0	33	55.0	**0.00**	**1.00**
	Arterial venous fistula	27	45.0	27	45.0		
Care of shunt	Waking	57	95.0	60	100.0	**3.077**	**0.079**
	redness	3	5.0	0	0.0		
Dental hygiene and Brushing frequency	Once or more daily	5	8.3	60	100.0	**101.54**	**0.00***
	less than once daily	51	85.0	0	0.0		
	Never	4	6.7	0	0.0		
Flossing frequency	Never	53	88.3	53	88.3	**0.00**	**1.00**
	Use mouthwash	7	11.7	7	11.7		
Frequency of dental examination	More than once annually	5	8.3	5	8.3	**0.00**	**1.00**
	As needed	55	91.7	55	91.7		
walk	5-10 minute	60	100.0	0	0.0	**120**	**0.00***
	more than 15 minute	0	0.0	60	100.0		
Cycling	Yes	0	0.0	41	68.3	**62.278**	**0.00***
	No	60	100.0	19	31.7		

* Significant at P<0.05.

Table (3): Represents characteristics of dialysis among studied sample pre and post 3 months of intervention. The results found that the arterial venous graft represent more one half (55%) of the patients have an arterial venous graft. The years of dialysis it was found that (71.7%) of the studied patients range from 5- 10 yearsdialysis. Regarding, walk, cycling, dental hygiene and brushing frequency, the studied patients pre and after 3months from intervention, there were significant differences and improvement in studied patients characteristics P (0. 00*).

Table (4): Health problems among studied sample pre and post 3 months of intervention.

Problems		Pre (n=60)		Post 3 months (n=60)		χ^2	P
		N	%	N	%		
Oral problems	Lesion	7	11.7	8	13.3	**63.976**	**0.00***
	Dryness	6	10.0	0	0.0		
	Angular cheilitis	18	30.0	0	0.0		
	White patches	8	13.3	14	23.3		
	Glossitis	7	11.7	0	0.0		
	Ulceration	8	13.3	0	0.0		
	no any signs	6	10.0	38	63.3		
Gastrointestinal system	Dry mouth	6	10.0	0	0.0	**63.781**	**0.00***
	Decreased appetite	54	90.0	19	31.7		
	nothing	0	0.0	41	68.3		
Integumentary system	Dry skin	31	51.7	20	33.3	**71.373**	**0.00***
	Itching	29	48.3	0	0.0		
	nothing	0	0.0	40	66.7		
Musculoskeletal system	Muscle cramps	2	3.3	0	0.0	**53.165**	**0.00***
	Bone &joint pain	55	91.7	24	40.0		
	Swelling in legs	3	5.0	0	0.0		
	nothing	0	0.0	36	60.0		
Activity of daily living	Partial dependence	55	91.7	27	45.0	**30.193**	**0.00***
	non dependence	5	8.3	33	55.0		
Circulatory and respiratory system	Cough	12	20.0	7	11.7	**1.646**	**0.439**
	Shortness of breath	8	13.3	10	16.7		
	Nothing	40	66.7	43	71.7		
Neurological system	Numbness/tingling in feet	60	100.0	0	0.0	**120**	**0.00***
	Feeling tired & lack of energy	0	0.0	8	13.3		
	nothing	0	0.0	52	86.7		
Psychological state	Worrying	30	50.0	21	35.0	**56.471**	**0.00***
	Feeling irritable	30	50.0	4	6.7		
	nothing	0	0.0	35	58.3		

* Significant at P<0.05.

Table (4): Illustrates health problems among studied sample pre and post 3 months of intervention. Regarding,Oral problems , Gastrointestinal system, Integumentary system, Musculoskeletal system, Activity of daily living,Neurological system and Psychological state of the studied patients pre and after 3months from intervention, there were significant differences and improvement in studied patients characteristics. P (0. 00*).

Table (5): Comparison of SF36 scale among studied sample pre and post 3 months of intervention.

Problems		Pre (n=60)		Post 3 months (n=60)		χ^2	P
		N	%	N	%		
1. Health	Very Good	0	0	41	68.3	**69.976**	**0.00***
	Good	25	41.7	16	26.7		
	Fair	33	55.0	3	5		
	Poor	2	3.3	0	0		
2. Health rate	Somewhat better now than one year ago	0	0	38	63.3	**60.058**	**0.00***
	About the same as one year ago	47	78.3	22	36.7		
	Somewhat worse now than one year ago	13	21.7	0	0		
3. Health limit inactivities	Yes, Limited A Lot	7	11.67	0	0	**11.083**	**0.004***
	Yes, Limited A Little	53	88.33	56	93.33		
	Not Limited At All	0	0	4	6.67		
4. physical health problems	Yes	60	100	18	30	**64.615**	**0.00***
	No	0	0	42	70		
5. emotional problems	Yes	60	100	20	33.33	**60.00**	**0.00***
	No	0	0	40	66.67		
6. physical health	Slightly	0	0	60	100	**120**	**0.00***
	Moderately	54	90	0	0		
	Quite a bit	6	10	0	0		
7. physical pain	None	0	0	11	18.3	**52.053**	**0.00***
	Very mild	26	43.3	49	81.7		
	Mild	21	35.0	0	0		
	Moderate	13	21.7	0	0		
8. pain interfere normal work	Not at all	0	0	22	36.7	**40.20**	**0.00***
	A little bit	42	70	38	63.3		
	Moderately	18	30	0	0		
9. feel during	Some of the Time	60	100	60	100	-	-

the past 4 weeks.							
10. physical health or emotional problems	Most of the time	19	31.7	0	0.0	**120.00**	0.00*
10. physical health or emotional problems	Some of the time	41	68.3	0	0.0	**120.00**	0.00*
	A little of the time	0	0	60	100.0	**42.450**	0.00*
11.General health	Mostly True	0	0	13	21.67		
11.General health	Don't Know	33	55	47	78.33	**42.450**	0.00*
	Mostly False	27	45.00	0	0		

* Significant at P<0.05.

Table (5): Shows comparison of SF36 scale among studied sample pre and post 3 months of intervention. It was found that, there were significant differences and improvement in studied patients of all domains of QOL scores, P (0. 00*). It is noticed that the domain with the lowest score in the pre and post-tests was that of the work status. Also the table indicates weak to strong statistically significant positive correlations in all domains of SF36. On the other hand, feel during the past 4 weeks, and a very nervous person have the highest scores both at the pre and posttests and there no significant differences.

Table (6): Comparison of Multidimensional Fatigue Inventory (MFI) among studied sample pre and post 3 months intervention.

Fatigue items		**Pre (n=60)**		**Post 3 months (n=60)**		χ^2	**P**
		N	**%**	**N**	**%**		
1.General fatigue.	4-10 Low fatigue level	10	16.7	57	95	**74.649**	**0.00***
	11-20 High fatigue level	50	83.3	3	5		
2. Physical fatigue.	4-10 Low fatigue level	0	0	32	53.3	**43.636**	**0.00***
	11-20 High fatigue level	60	100	28	46.7		
3.Reduced motivation.	4-10 Low fatigue level	25	41.7	37	61.7	**4.805**	**0.028***
	11-20 High fatigue level	35	58.3	23	38.3		
4.Reduced activity.	4-10 Low fatigue level	0	0	32	53.3	**43.636**	**0.00***
4.Reduced activity.	11-20 High fatigue level	60	100	28	46.7	**43.636**	**0.00***
5.Mental fatigue.	4-10 Low fatigue level	34	56.7	55	91.7	**31.947**	**0.00***
	11-20 High fatigue level	26	43.3	5	8.3		

* Significant at P<0.05.

Table (6): Shows comparison of Multidimensional Fatigue Inventory (MFI) among studied patient's pre and post 3 months intervention. It was found that, there were significant differences and improvement in studied patients of all domains ofMultidimensional Fatigue Inventory (MFI) scores, P (0. 00*) except reduced motivation P= 0.028. It is noticed that the domain with the lowest score in the pre and post-tests was that of the work status. Also the table indicates weak to strong statistically significant positive correlations in all domains (MFI).

Table (7): Comparison of Multidimensional Fatigue Inventory (MFI) among studied sample according to their age pre and post 3 months intervention.

* Significant at P<0.05. Fatigue Items		Age									
		Pre (n=60)					Post 3 months (n=60)				
		From 18 to less 45(n=14)		From 45 and more (n=46)		χ^2 P	From 18 to less 45 (n=14)		From 45 and more (n=46)		χ^2 P
		N	%	N	%		N	%	N	%	
1.General fatigue	4-10 Low fatigue level	7	50	43	93.48	35.801 0.002*	11	78.57	46	100	0.486 0.874
	11-20 High fatigue level	7	50	3	6.52		3	21.43	0	0	
2.Physical fatigue	4-10 Low fatigue level	5	35.71	30	65.22	9.216 0.027*	7	50	25	54.35	10.05 0.024*
	11-20 High fatigue level	9	64.29	16	34.78		7	50	21	45.65	
3. Reduced motivation	4-10 Low fatigue level	7	50	28	60.87	12.032 0.034*	7	50	30	65.22	10.05 0.024*
	11-20 High fatigue level	7	50	18	39.13		7	50	16	34.78	
4.Reduced activity.	4-10 Low fatigue level	7	50	30	65.22	10.05 0.024*	6	42.86	30	65.22	9.113 0.025*
	11-20 High fatigue level	7	50	16	34.78		8	57.14	16	34.78	
5. Mental fatigue.	4-10 Low fatigue level	14	100	20	43.48	26.337 0.004*	10	71.43	43	97.83	15.803 0.001*
	11-20 High fatigue level	0	0	26	56.52		4	28.57	1	2.17	

Table (7): illustrates comparison of Multidimensional Fatigue Inventory (MFI) among studied sample according to their age pre and post 3 months intervention. It was found that, their age from 18 to less than 45 years and more than 45 years pre test there were significant differences and improvement in studied patients of general fatigue, physical fatigue , reduced motivation , reduced activity and mental fatigue domains ofMultidimensional Fatigue Inventory (MFI) scores, P =(0.002), (0.027), (0.034)and (0.004) respectively. On the other hand, their age from 18 to less than 45 years and more than 45 years post 3 months, there were significant differences and improvement in studied patients of physical fatigue, reduced motivation,, reduced activity and mental fatigue domains ofMultidimensional Fatigue Inventory (MFI) scores , P^{*} = (0.024) , (0.024) (0.025) and (0.001) respectively.

III. Discussion

Patients under hemodialysis have significant reduction of physical capacity compared to healthy sedentary individuals of the same sex and same age[41]. **Howden et al., (2012)**,who reported that, the benefits of exercise training has been well demonstrated in a range of disease conditions including end stage renal disease and was recently highlighted by a systematic review in hemodialysis patients [42]. Although there have been numerous recent studies on the benefits of exercise, few dialysis clinics or nephrologists provide encouragement of exercise programs as a part of routine care for their patients. Moreover adaptation of routine counseling and encouragement for physical activity has the potential to improve outcomes, improve physical functioning, and optimize quality of life and the overall health of dialysis patients [43].Nephrologists, nurses, and dialysis staff are in an excellent position to encourage sustained physical activity and have the opportunity to act as role models for dialysis patients[43].

For intradialytic exercise, it is safer to train during the first 2 h of the hemodialysis session because, after 2 h of dialysis, shifting of fluid from the microvasculature to the interstitial during exercise can cause a rapid reduction in relative blood volume with accompanying cardiovascular decompensation which may preclude further exercise[44].

This study carried out to determine the effect of exercise in intra hemodialysis and patient outcomes. The results of the socio-demographic data showed that the higher percentage of the studied patients more than two third were between forty five and less than sixty five years of age, and more than three quadrant of the sample were male. This results was parallel with the study done by **Bayoumi et al.,(2014)**, who presented that their demographic data for patients undergoing hemodialysis about two third sixty and less years of age patients and more than fifty percentage of their sample were male [45]. According to **Johansen (2008),** suggested that the recommendations for older adults (65 years and above) and adults aged 50–64 years with clinically significant chronic conditions and/or functional limitations, published in 2007 by the AmericanCollege of Sports Medicine and the American Heart Association can be applied to patients with advanced CKD[46].

In relation to laboratory investigations, hemoglobin, serum creatinine, serum urea, serum potassium, and serum albumin had changed and improved. These data strengthen the previous findings, **Kong et al., (1999)**,who quoted that, urea, creatinine, potassium and uremic toxins are slowly transferred from the relatively poorly perfused tissues (especially inactive muscles) to the circulation, giving rise to a post dialysis, rebound' of the concentrations in circulation. A single bout of exercise reduced the rebound of urea, creatinine and potassium, possibly because of increased perfusion of skeletal muscle [47]. **Lott et al., (2001)**, quoted that the possible contributor to these beneficial effects on potassium and phosphate is the shift of these ions from the intracellular compartment into muscle interstitial fluid that occurs during exercise [48]. Also **Cheema et al., (2007)**, whoquoted that , it is widely accepted that exercise is beneficial in patients with end stage renal failure improving physical functioning in general, including maximal oxygen uptake, muscle strength, nutritional and hematologic status, inflammatory cytokines, and QOL, it is unclear whether the benefits of exercise are unlimited [49].**Kutner (2012)**, quoted that, the evidence from other studies that exercise training for end stage renal disease patients helps the improvement in arterial stiffness, decrease in pulse pressure, increased aerobic capacity, reduced need for antihypertensive medications, increase in concentration of hemoglobin and hematocrit levels and improved lipid metabolism [50]. Also other study done by **Koh et al., (2009)**,in patients undergoing 12 weeks of intradialytic training, statistically significant improvements in muscle strength of the quadriceps and biceps were observed, improving physical function and vitality and the QOL domains [51].

As regarding the oral problems, the majority of studied patients showed oral sign and/or symptoms. In agreement with some studies in most cases they were taste change, dry mouth, malodor, and dental calculus [52]. Dry mouth in HD patients can be caused by uremic involvement of the salivary glands and dehydration due to the restriction of fluid intake, also use of mouth washes containing alcohol, adverse effects of drug therapy, or mouth breathing [53]. The studied patients had poor dental hygiene and a high the decayed, missing and filled teeth, especially women, singles, those with low dialysis adequacy, and with a low educational level. This results was parallel with the study done by **Malekmakan et al., (2011),**who presented that the demographic data for patients undergoing hemodialysis.These results would imply further emphasis on the effective

implementation of an oral health promotion program. The oral health maintenance plan for patients receiving dialysis should be reinforced by the dialysis team and dentists. HD patients should be given initial oral examinations and frequent follow-ups [(54)].

According to **Konstantindou et al.,(2002)**, who quoted that,at moderate exercise intensity it cause of a significant improvements in exercise capacity occur, but may be manifested only slowly (typically after about 12 weeks) [(55)]. This agree with this study which reported that the improve in studied patients, in musculoskeletal system , activity of daily living circulatory, respiratory system and neurological system post 3 months.

It was clear from the observations that exercise induced an overall diminution of physical and psychological improvement, including the "will to live", leading to positive expectations about the return to a productive life. These subjective observations were confirmed in the application of the SF36. Also we observed a substantial improvement in quality of life in all evaluated parameters, such as functional ability, physical appearance, and perception of pain, general health, vitality, social function, emotional status, and mental health. These results indicated that the exercise program during hemodialysis was reliable in demonstrating an improved quality of life.

In the study of **Deligiannis (2004)**, who reported that the exerciseprogram during hemodialysis was reliable in demonstrating an improved quality of life, also he said, the patient's gradually gained fitness and muscle strength with exercise and could train to above level, a fact that surprised the patient, raising his self-esteem and the patient became able to return to daily living activities that he thought to be untenable, such as playing a musical instrument and meeting with friends over the weekend, activities that had been curbed after he started hemodialysis [(56)].Other study done by **Ronaldo et al., (2013)**, whorepresented that, it is striking that, despite their protocol not showing an improvement in biochemical parameters, an exercise program of only 8 weeks was enough to induce a significant improvement in quality of life, indicating that the exercise protocol, by its simplicity and adherence, makes it feasible in any environment where patients undergo dialysis sessions[(57)].

Training of exercise during dialysis treatments may improve solute removal by increasing blood flow to muscle and efflux of urea and other toxins into the vascular compartment where they can be removed [(58)]. According to **Bennett (2012)**, who reported the concept of dialysis exercise adequacy and emphasized thatincreasing the exercise and activity of the dialysis population can decrease mortality, improve quality of life, improve physical function and decrease depression [(59)]. Moreover, **Song and Sohng (2012)**,who recommended that a progressive resistance training using elastic bands and sandbags can be utilized as part of a regular care plan for hemodialysis patients, and the benefits significantly improved the skeletal muscle mass, grip, leg muscle strength, and quality of life [(58)]. Exercise might have beneficial effects on the quality of life of dialysis patients by improving mental and physical functions and contributions to maintain electrolyte balance[(60)].

In the present study, patients appeared to enjoy and interesting in doing the turning exercise during session of hemodialysis, their expressed comments such as "their feels better and healthier". The patients became actives and easy to walk , improve their appetites , eat well. And their hop complete recovery from renal failure. All of these comments reflect our study results, whereas the pre and post program quality of life scores statistically improved in all domains. Exercise training in end stage of renal failure has lessened the impact of ramifications by the attenuation of uremic neuropathies and myopathies, improved cardiac function, increased physical work capacity, and overall enhancement in health related quality of life[(61)]. Although most exercise programs have been instituted between dialysis sessions, recent investigations have promoted the concept of intradialytic exercise as a convenient intervention to improve compliance, provide motivation in a structured environment, and facilitate the medical monitoring of the exercising patient [(43)]. This results paralleled with this studied who represented that, improvement in all diminution quality of life and all domain of Multidimensional Fatigue Inventory (MFI).

Mental health needs, especially debilitating levels of depressed mood and clinical depression, are prevalent among renal patients especially those who are undergoing dialysis [(62)]. Antidepressants are frequently advised, but negative side effect and drug interactions of antidepressants are of concern [(63)]. **Yaghmayi (2005)**, quoted that chronic renal failure has mutual effects on physical, psychological and functional status of individuals which causes types of deprivation and lifestyle changes including financial problems, unemployment, change in familial roles, restriction in fluid intake and diet and reduction in achieving long term goals. Stress is directly associated with the risk of chronic renal failure such as hypertension [(63)]. Further-more, other studies have pointed out that stress is correlated with low socioeconomic status and such conditions can be a risk factor for progression of chronic renal disease through association with other socio-mental factors and behaviors such as alcohol consumption, smoking and drug use [(64)].

According to, **Sathvik et al., (2008)**, reported that ESRD is a chronic disease that has a high level of disability in different domains of patient lives leading to impaired QOL[(65)]. **Mittal et al., (2001)** found that patients on hemodialysis treatment have poorer QOL than other chronic diseases such as chronic heart failure, diabetes mellitus, and chronic lung disease [(66)]. In a comparative study by **Sprangers et al., (2000)**, between

different chronic conditions it was found that renal diseases and musculoskeletal diseases have greater physical and functional impairment. Patient is with renal diseases reported the poorest level of general health [(67)]. This results paralleled with this studied who represented that, impaired QOL pre exercise and improvement in all diminution quality of life and all domain of Multidimensional Fatigue Inventory (MFI).

As regarding prevalence of fatigue, it was found that 80.3% high fatigue level in general fatigue , this agree with **Letchmi et al., (2011)** who reported that, the prevalence of fatigue ranges from 45% to as high as 80% in Hemodialysis patients and from 30% to 70%in peritoneal dialysis patients [(68)]. These ranges are wide because of the various instruments used to measure its presence and severity. Interestingly, fatigue was the most frequent and debilitating symptom in some large studies exploring the prevalence of symptoms in Hemodialysis patients and their relationship with quality of life [(69)].

Fatigue, it was found that the differences and improvement between pre and post three months exercise, this result agree with, **Chang et al.,(2012)**, who quoted that, the recent randomized trial has shown that in Taiwan HD patients, intradialytic leg ergometry was effective in reducing fatigue and improving physical fitness in already active Hemodialysis patients and to reduce fatigue in sedentary patients [(70)]. **Painter et al., (2000)**, reported improvement in many SF-36 QOL domains including role physical, bodily pain, general health, vitality, and the physical component scale, especially in patients with low baseline perceptions of physical functioning [(71)]. **Storer et al., (2005)**, showed that 9 weeks of leg-cycling during HD improves muscle strength, power, fatigability, and physical function [(72)]. In the study by **VanVilsterenet al., (2005)**, an exercise program consisting of cycling during dialysis together with a predialysis strength training lasting 12 weeks had beneficial effects on physical fitness, general health perception, and fatigue [(73)]. This agrees with this study, which represented that improvement of patient outcome after 3 months exercise.

IV. Conclusion And Recommendations

Exercise programs for hemodialysis patients, ESRD patients, and exercise programs are still not a part of routine clinical practice in many centers. In conclusion, exercise or regular physical activities should be mandatory, not optional, in patients with ESDR. However, despite the many beneficial effects of exercise in the application of a supervised program of exercise in renal failure patients during hemodialysis was associated with improvement in Quality of life and decrease fatigue. Furthermore, we are hopeful that this review may assist dialysis staff in their quest to establish and sustain their exercise programs as a routine care during session of hemodialysis. The optimal recommendation of exercise for patients with renal failure during hemodialysisshould be done. Exercise planning should be scheduled at optimal volume and intensity and be based on the patient's age and comorbidities. Exercise in this high risk population should be structured to favors compliance and cost effectiveness.

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