Adherence of Chronic Renal Failure Patients Undergoing Maintenance Hemodialysis with Their Therapeutic Regimen

Heba E . Goma [1], Afaf A . Basal[2], Kamal M. Okasha[3], Zeinab M. Shaban[4].

[1] *Baccalaureate Degree in Nursing Science, technical institute of Elmebra, Tanta , Egypt .*

[2] *Professor of Medical Surgical Nursing, Tanta University, Faculty of Nursing, Egypt*
[3] *Professor of Internal Medicine and Nephrology. Faculty of Medicine, Tanta university Egypt*
[4] *Lecturer of Critical care Nursing and Emergency. Faculty of Nursing, Tanta University, Egypt*

 Abstract :

Background: Adherence with the prescribed medical regimen is a crucial factor for achieving good therapeutic results in dialysis patients. **This study aimed to:** Assess adherence of chronic renal failure patients undergoing maintenance hemodialysis with therapeutic regimen. **Subjects and Method: Setting:** In the dialysis Unit at International Educational Hospital, Student Educational Hospital of Tanta University and Health Insurance Hospital. **Subjects**: A convenience sample of 200 adult patients with CRF admitted to Hemodialysis Units at Scheduled. **Three tools were used,** Tool (I) Structured interview schedule.Tool (II) Patient's knowledge assessment questionnaire, Tool (III) GR-Simplified Medication Adherence Questionnaire Hemodialysis. **Results :** It was observed that vast majority (83%) of studied patients had adherence with medication , more than two third (68.5%) of studied patients had adherence with follow up , while more than half (55.5%) had in-adherence with dietary instructions and (44.5%) had adherence .there was a high positive significant correlation between knowledge score and adherence . **Conclusion:** the results revealed that studied patients with good knowledge score appeared adherence with the GR-SMAQ-HD scale, while studied patients who had poor knowledge appeared In-adherence. **Recommendations:** Counseling should be provided for all patients who are undergoing Hemodialysis that helps in preparation of them and give advice in adherence of therapeutic regimen   .

 Key words: Hemodialysis   , Adherenc , Therapeutic Regimen .

Introduction

Chronic kidney disease (CKD) is a progressive disease that cannot be reversed and can lead to kidney failure or end-stage renal disease (ESRD), if it is not detected and treated early. Because of its chronic nature and potentially serious complications, individuals suffering from CKD experience poor quality of life, financial burden, and significant life changes that also affect their families. CKD is devastating due to extreme poverty, poor accessibility to health care, and a diverse population that makes standardized health education difficult if not impossible because of differences in culture, values, and beliefs [1,2].

Globally, chronic renal failure is major health issue in various parts of the world. Its problem both at the personal and national level, increased risk of cardiovascular disease and can cause high mortality rate worldwide. It refers to a disorder in which kidney damage or reduced glomerular filtration rate (GFR) occurs for three months or longer [3, 4].

End-stage renal disease is increasing worldwide. Renal replacement therapy (RRT) and kidney transplantation are increasing the burden on health systems. This condition is particularly serious in developing countries where health resources are inadequate [5].

According to 9th Annual Report of the Egyptian Renal Registry provided by Egyptian Society of Nephrology and Transplantation (ESNT), prevalence of ESRD in Egypt raised to 483 patients per million. ESRD is one of the main health problems in Egypt [6]. Hemodialysis represents the main therapeutic modalities for treatment of CKD such as hemodialysis (HD), peritoneal dialysis, or kidney transplantation patients undergo dialysis for at least 18 hours per week. Nurses comprise the main providers of hemodialysis care [7,8].

Hemodialysis treatment is the most common type of renal replacement and alternative way of treatment in chronic renal failure patients. it' lifesaving procedure for patients with end stage kidney disease it gives more chance of living to the patients that filters waste, removes extra fluids and electrolytes [9,10]. so the patients need to be adherent to the therapeutic regimen which include adherence to the prescribed medications, diet, fluid restriction, and attendance of hemodialysis sessions. Non-adherence to the prescribed regimen is a common problem in hemodialysis and is associated with increased morbidity and mortality [11,12].

The World Health Organization (WHO)

defines adherence as the extent to which the persons' behavior including medication-taking corresponds with agreed recommendations from a healthcare provider. it includes the initiation of the treatment , implementation of the prescribed regime, and discontinuation of the pharmacotherapy [13,14].

Compliance and adherence are used interchangeably. Unfortunately, poor patient adherence to haemodialysis is a prevalent problem in health care that has considerable medical, social and economic consequences, predominantly among patients undergoing hemodialysis[15].

According to National Kidney Foundation-Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) non-adherence in hemodialysis (HD) includes non-adherence to pharmaceutical treatment, omitting or shortening the time of HD session, excessive intake of fluids and foods containing potassium and phosphorus. ESRD under hemodialysis is a long-term illness that deprives patients of living a normal life .factors, which influence HD patient adherence, vary and may be treatment- related, condition-related, health system-related or socioeconomic[16].

The main types of non-adherence categorization are indisputable and there is a degree of overlap. The firs type is primary non adherence, in which providers write prescription but the medication is never filled or initiated, this type is commonly called non fulfillment adherence [17]. A second type of non-adherence is called non persistence in which patients decide to stop taking a medication after starting it without being advised by a health professional to do. So is rarely intentional and happens when patients and provider 'miscommunication about therapeutic plans [18]. A third type of non-adherence is non-conforming, includes a variety of ways in which medication are not taken as prescribed, this behavior can range from skipping doses to taking medications at incorrect times or at incorrect doses, to even taking more than prescribed [19].

Nurses must respect the beliefs and choices of the patient and must assess the degree of adherence, avoiding judging the patient. Tailoring the therapy to the patients' needs is sometimes necessary. this includes investigating patients' preferences, simplifying dosing regimens, and using adherence aids. No single intervention leads to large improvements in adherence and treatment outcomes, but a combination of interventions, human

behavior's motivations are multiple, complex and sometimes unspecified [20].

Aim of the study

The aim of this study is to assess adherence of chronic renal failure patients undergoing maintenance hemodialysis with therapeutic regimen.

Research questions:

-What was the extent of adherence of hemodialysis patients to therapeutic regimen?

-What were the factors affecting adherence of hemodialysis patients in relation to therapeutic regimen?

Subjects and Method

Study design:

Descriptive cross - sectional design was used achieve the aim of the study and answer the research questions.

Setting of the study:

This study was conducted in dialysis Unit at International Educational Hospital, Student Educational Hospital of Tanta University and Health Insurance Hospital.

Subjects:

A convenience sample of 200 adult patients with CRF admitted to Hemodialysis Units at Tanta University and Health Insurance Hospital and Scheduled for hemodialysis were recruited to the study. The sample size was calculated using a power analysis by using EP – info software package .

The inclusion criteria were as follow:

• Confirmed diagnosis of chronic renal failure.

Adult patients from (21 to 60 year).

- Undergoing hemodialysis for at least 6 months and receive dialysis at least three times weekly .

- Conscious patient able to communicate and accept to participate in the study .

The exclusion criteria were as follow:

- Patients with history of mental illness .

- Malignance carcinoma .

Data collection tools:

Three tools were used at this study after reviewing the relevant literature [21-26]. Those three tools aimed to assess adherence of chronic renal failure patients undergoing maintenance hemodialysis with therapeutic regimen Tool (I): Structured Interview Schedule. Tool (II): Patient's Knowledge Assessment Questionnaire (PKAQ). Tool (III): GR-Simplified Medication Adherence Questionnaire Hemodialysis (GR-SMAQ-HD).

Tool (I): Structured Interview Schedule: This tool was developed by the researcher based on relevant literature review for collection of baseline data [27-30], to assess patient's socio demographic data, clinical information and their knowledge about hemodialysis and Clinical and investigation

data. It consisted of four parts as follow:

Part 1: Socio demographic data:

 It was developed to assess patient's socio demographic data that covered the following variables: patient's name, age, sex , marital status, occupation , smoking history , education level ,income , place of residence, socioeconomic status , income , type of medication coverage , telephone number and the daily number of pills taken .

Part 2: **Past medical history:**

 This part was consisted of statements that used to assess patients information about their health history, it was comprise the following areas: past medical history (Diabetes, Kidney disease, Hypertension, Heart disease, Liver diseases, Pulmonary diseases, Cancer, Blood diseases).

History of hospitalization, medical history as (Hypertension, Chest crunch, angina pectoris, heart clot diabetic coma, hepatic coma, anemia) Surgical history as (Finger amputation, incident, Knee cartilage, Heart catheterization, Hernia process and network installation To make a speculum, arterial vein joint and History of taking any type of medication previously, last laboratory studies, heart rate, respiration rate, blood pressure, associated chronic diseases.

Part 3: hemodialysis data:

This part was developed to assess patients knowledge about hemodialysis such as: duration of hemodialysis treatment, site of vascular access , complication , number of hemodialysis treatment per week , number of, hours in each session , pre – hemodialysis (HD) weight and post HD weight .

Part 4: Clinical and investigation data: this part was developed to assess patient's clinical and blood chemistry, fluid and electrolytes. Such as: Biochemical markers of pre-hemodialysis serum phosphorus and potassium, kidney and liver function tests complete blood picture.

Tool (II):   Patient's knowledge assessment questionnaire: (PKAQ): It was developed by researcher after review the relevant Literature written in Arabic language[27-30,21-23,26] to assess patient's knowledge about renal failure disease process such as: Definition and causes , hemodialysis: definition, purposes , side effect, and investigation. Treatment regimen including diet and fluid restrictions, medication adherence, importance of adhering to hemodialysis sessions, care of blood access site.

 Scoring system: Patient who was responded by correct and complete answer was given a score two, correct and incomplete answer was given a score one and the patients who responded wrong and Incorrect answer was given a

score zero.

Scoring system of patient's knowledge assessment questionnaire was done as follow:

Items of knowledge 30 question so the total scoring system of patients knowledge was (60) and was classified as the following:

Very good level of knowledge was considered when total score of items response was from75% to more (45 - 60).

- Fair level of knowledge was considered when total score of items response was from 60% to less than 75%   (36 - 44).

- Poor level of knowledge was considered when total score of items response was from less than 60% of total score   (> 36).

Tool (III): GR-Simplified Medication Adherence Questionnaire Hemodialysis (GR-SMAQ-HD)

The original scale was developed by Alikari (2017)[13], to assess level of patient adherence to hemodialysis regimen. It was consists of eight items exploring the three dimensions of adherence in hemodialysis medication adherence include one to fourth items **,** Attendance at Hemodialysis Session include fifth and six items and Diet / Fluid restrictions include seventeen and eight items . Three of the items are dichotomous (Yes /No) While five are scored on a five point Likert – type Scale.

The internal consistency of the scale has been studied (Cronbach's Alpha 0.751) as the following. The score ranges from (0 - 8). Higher scores indicate higher adherence to HD regimen.

Method:

Administrative process:

- Official permission from the faculty of nursing was sent to authorities at the three selected units to conduct the study.

- permission was received from directors of dialysis Units at International Educational Hospital , Student Educational Hospital of Tanta University are affiliated to Tanta university Hospital and Health Insurance Hospital

- A Written approval hospital permission was obtained from the responsible authority of hemodialysis Units at International Educational Hospital, Student Educational Hospital of Tanta University and Health Insurance Hospital before conducting this study through official letters from faculty of nursing explaining the purpose of the study.

Ethical consideration:

- Written consent was obtained from every patient included in the study after explanation of the aim of the study and assuring them of confidentiality of collected data .

-Confidentiality and anonymity was maintained by the use of code number instead of name and the right of withdrawal is reserved

-Confidentiality was assured to the patient

- Nature of the study will not cause any harm or pain for the entire sample.

Tools development:

Tool (I) Structured interview schedule and Tool (II) patient's knowledge assessment questionnaire: (PKAQ): were developed by the researcher to collect the data after extensive review of literature [27-30,21-23,26]

Tool (III): GR-Simplified Medication Adherence Questionnair Hemodialysis (GR-SMAQ-HD). The orginal scale was developed by Alikari (2017) [13] to assess level of patient adherence to hemodialysis regimen.

Content validity:

- All tools of the study were reviewed for content validity by apanel of (5) expertises in the field of Medical Surgical Nursing, Nephrology at the Faculty of Nursing and Medical specialists, and also Biostatistics at the Faculty of Medicine. It was calculated and found to be = (96%).

- Modifications were done to certain relevance and completeness.

Reliability of the tools:

The reliability for the study tools was calculated by Cronbach's Alpha test; it was 0.786 for Tool I and 0. 853 for Tool II, which consider highly reliable tools.

A pilot study:

It was conduct on 10% (20) hemodialysis patient in Hemodialysis Unit to test the clarity, feasibility and applicability of the different items of the determent tools to detect any obstacles that may be encountered during the period of data collection and needed modification will be done by researcher before study according to the experience gained from this pilot study has been done Subject of pilot study are excluded from the original sample and the subject was selected randomly

Data collection:

Data collection duration period was 6 months started from first of July to the end of December in 2019. The researcher collected the data through the morning and the afternoon sessions throughout the week to cover the entire patients as they had fixed hemodialysis session time, data was collected by using tool I ، tool II & tool III during the morning and afternoon shift according to each Hospital rules, in the Hemodialysis Units at Health Insurance Hospital during the time after one hour of insertion to hemodialysis. About 5 to 10 patients were interviewed daily from 10:30 Am to 12:30 Am, through two days / week

Also, in the Hemodialysis Units at Students Educational Hospital of Tanta

University during the time after one hour of insertion to hemodialysis. about 5 to 10 patients were interviewed daily from 2: 30 pm to 4:30 pm, through two days / week, and in the Hemodialysis Units at International Educational Hospital of Tanta University during the time after one hour of insertion to hemodialysis about 5 to 10 patients were interviewed daily from 2: 30 pm to 4:30 pm, through another two days / week.

- The selected patients who met the inclusive criteria were asked to participate in the study after establishing trusting relationship and explaining the aim of the study. After that all patients provided written informed consent for participation in the study. Then data was collected during interview. Each patient were reassured that, they obtained information will be confidential and used only for the purpose of the study.

 - The researcher was available in hemodialysis unit for any expectations and checking each question after complete to be sure that all questions were answered. (Each interview duration ranged from 30 to 40 minutes).

- In the event of no answer, patients were further asked whether or not they wished to receive information about this specific item. On other hand, in the event of positive answer, they were discussed about their knowledge and from whom did they get the knowledge from.

- After data collection, data was coded, analyzed then tabulated under the direction of a statistician to obtain results to answer the research questions.

Finally, most new patients approach a hemodialysis procedure with fear. Moreover, to lessen or even prevent this, providing patients with information about the disease, hemodialysis and important of adherence to therapeutic regimen is essential in order to prepare the patients physically, emotionally and intellectually for the procedure of hemodialysis.

Statistical analysis:

 The following tests used in the study were chi square test to assess the relationship between knowledge and the GR-Simplified Medication Adherence of patients undergoing hemodialysis.

The data was collected and statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 20 for continuous variables (mean ±SD, Linear Correlation Coefficient and chi-square tests Linear Correlation Coefficient [r]: was used for detection of correlation between two quantitative variables in one group.

10. The level of significance chose in the study was set at 0.05 levels.

-Non significance if P-value > 0.05

-Significance   if P-value < 0.05

-High significance if P-value < 0.001

Results

Table (1) illustrates percent distribution of studied patients according to their socio demographic characteristics. The table revealed that the mean age of studied patients was (46.78±6.52) more than half (56.0%) in the age their age late adult hood ranged from 51 to 60 years old   and, majority of them (84.0%) were male, while only (16.0%) were females, and majority (81%) of the studied patients were married and less than half (47.5%) of studied patients had employee. Moreover, it was observed that nearly less than one third of studied patient (46%) were preparatory school.

 Table (2): illustrates Percent distribution of studied patients according to their adherence to treatment regimen. It shows that, majority (96%) of studied patients didn't feel bad about their condition deteriorates when they stop taking their medications .In relation to forget to take medicines, nearly four fifth (78%) of studied patients didn't forget to take medicines. Regarding their forgot to take your medications during the time between two dialysis sessions , the result show that nearly more than three quarters (82%) of studied patients didn't forgot to take their medications during the time between two dialysis sessions .

Table (3) illustrate percent distribution of studied patients regarding to level of the GR-Simplified Medication Adherence Questionnair Hemodialysis (GR-SMAQ-HD) scale among studied subjects. This table showed that, less than two third (61%) of studied patients had adherence with the GR-SMAQ-HD scale, while more than one third (39 %) of them had non-adherence with the GR-SMAQ-HD scale.

Table (4) illustrates Correlation between studied patient's total knowledge score and adherence. It can be seen that, there was highly positive significant correlation (r=0.375, 0.427, 0.169, 0.395, 0.427 respectively) between knowledge score and adherence, P value <0.001.

Table (5) illustrates Relation between patient's total knowledge score and the GR-SMAQ-HD scale. It is observed that, majority (89.6%) of studied patients had good knowledge and adherence with medication, while majority (93.8%) had good knowledge, adherence with follow up and majority (89.6%) had good knowledge, adherence with fluid restrictions, Also less

than two third (60.4%) had good knowledge and adherence with dietary instructions .It was found that, majority (93.8%) of studied patients had good knowledge and adherence with the GR-SMAQ-HD scale. Moreover , there was <0.05.

Table (6) illustration Relation between socio of studied subjects and their The GR-SMAQ-HD scale. This table showed that the age of studied patients from 51 to 60 years old, more than half (58.9%) who had Adherence with The GR-SMAQ-HD, (41.1%) had In-adherence, and less than three fourth (73.8%) of studied patients who had adherence were male, while (26.2%) had in-adherence . On other hands more than half (53.1%) of studied patients who had adherence were female , while nearly less than half (46.9%) patients

high a statistical significant difference among studied patients between knowledge and medication , follow up , fluid restriction , dietary instruction and The GR-SMAQ-HD scale , p-value was

had in-adherence. As regards to marital status, more than two third (67.9%) of studied patients who had adherence were married, while (32.1%) had in-adherence. Also, more than half (58.9%) of studied patients who had adherence were employee, while less than half (41.1%) had in-adherence. It was found that, there was a highly statistical significant difference between adherence in relation to age , sex , marital status, occupation, level of education, residence and economical status, p-value was <0.001**

Table (1): Percent distribution of studied patients according to their socio demographic characteristics (n = 200)

| Personal information	N=200	%
Age (years)		
21-30	20	10.0
31-40	28	14.0
41-50	40	20.0
51-60	112	56.0
Mean±SD	46.78±6.52	
Sex		
Male	168	84.0
Female	32	16.0
Marital status		
Single	24	12
Married	162	81
Divorced	9	4.5
Widow	5	2.5
Occupation		
Employee	95	47.5
Unemployed	79	39.5
Retired	26	13
Smoking history		
Yes	28	14.0
No	172	86.0
cessation of smoking		
Yes	12	42.9
No	16	57.1
How many cigarette per day		
Mean±SD	1.5±0.43	
Level of education		
Illiterate	40	20.0
Preparatory School	92	46
Secondary school	44	22.0
University	24	12.0
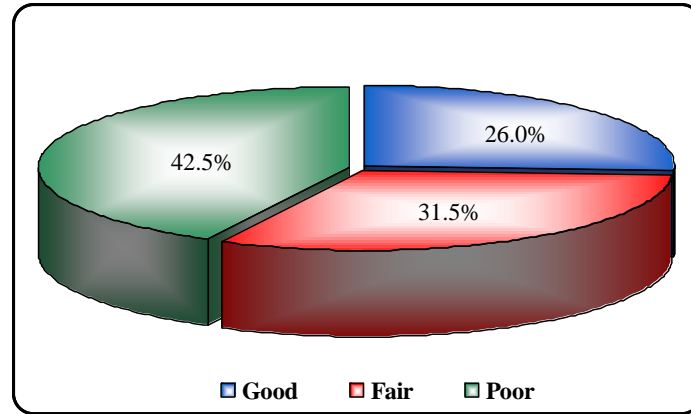
Figure (1): Percentage distribution of studied patients according to their total Level of the knowledge among studied subjects

Table (2): Percent distribution of studied patients according to their adherence to treatment regimen

| The GR-SMAQ-HD scale	N	%
feel bad your condition deteriorates, you stop taking your medications		
Yes	8	4
No	192	96
forget to take medicines		
Yes	44	22
No	156	78
forgot to take your medications during the time between two dialysis sessions		
Yes	36	18
No	164	82
not take the medicine during the last week		
3-5	8	4
1-2	52	26
None	140	70
Last month, how many times did you shorten the session by yourself		
4-5	8	4
3	32	16
2	16	8
1	24	12
I never did a shorter session than myself	120	60
Last month, how many minute did you shorten the session by patient		
>30 min.	24	12
21- 30 min.	32	16
11-20 min.	20	10
<=10 min.	8	4
Never	116	58
Over the past week, how often have you followed the instructions for fluid restrictions		
Never	24	12
Rarely	28	14
Sometime	32	16
Often	52	26
+every-time	64	32
During the past week, how many times have you followed the dietary instructions		
Never	28	14
Rarely	48	24
Sometime	20	10
Often	44	22
every-time	60	30
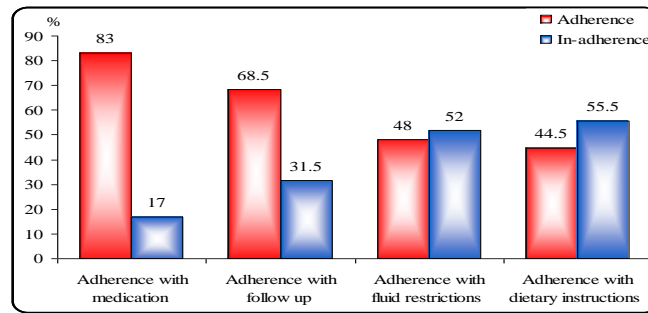
Figure (2): Percent distribution of studied patients according to their adherence to medication

Table (3): Percent distribution of studied patients regarding to level of the GR-Simplified   Medication Adherence Questionnaire –Hemodialysis (GR-SMAQ-HD) scale among studied subjects

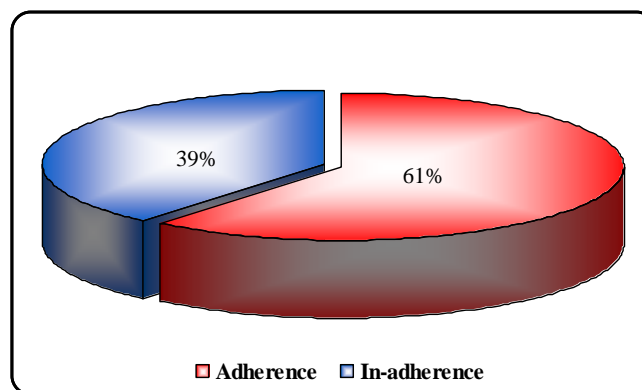| The GR-SMAQ HD scale	N	%
Adherence	122	61
non-adherence	78	39
Total	200	100

Figure (3) Level of the GR-Simplified Medication Adherence Questionnaire – Hemodialysis scale among studied subjects

Table (4): Correlation between studied patient's total knowledge score and adherence

Items of adherence	Total knowledge	
	R	P-value
Adherence with medication	0.375	0.002*
Adherence with follow up	0.427	<0.001**
Adherence with fluid restrictions	0.169	0.035*
Adherence with dietary instructions	0.395	<0.001**
The GR-SMAQ-HD scale	0.427	<0.001**

>0.05 Non significant   <0.05 significant   <0.001** High significant*

Table (5) : Relation between studied patient's total knowledge score and the GR-SMAQ-HD scale.

	Total knowledge							
	Poor		Fair		Good		Chi-square	
	N	%	N	%	N	%	X^2	P-value
Adherence with medication								
Adherence	52	66.7	71	95.9	43	89.6	25.011	<0.001**
In-adherence	26	33.3	3	4.1	5	10.4		
Adherence with follow up								
Adherence	35	44.9	57	77.0	45	93.8	36.858	<0.001**
In-adherence	43	55.1	17	23.0	3	6.3		
Adherence with fluid restrictions								
Adherence	15	19.2	38	51.4	43	89.6	59.451	<0.001**
In-adherence	63	80.8	36	48.6	5	10.4		
Adherence with dietary instructions								
Adherence	20	25.6	40	54.1	29	60.4	18.891	<0.001**
In-adherence	58	74.4	34	45.9	19	39.6		
The GR-SMAQ-HD scale								
Adherence	22	28.2	55	74.3	45	93.8	62.425	<0.001**
In-adherence	56	71.8	19	25.7	3	6.3		

>0.05 Non significant   <0.05 significant   <0.001** High significa*

Table (6) : Relation between socio of studied subjects and their adherence

	The GR-SMAQ-HD scale						
	Adherence		In-adherence		Total	Chi-square	
	N	%	N	%		X2	P-value
Age							
21-30	18	90	2	10	20		
31-40	23	82.1	5	17.9	28	16.736	<0.001**
41-50	34	85	6	15	40		
51-60	66	58.9	46	41.1	112		
Sex							
Male	124	73.8	44	26.2	168	5.53	0.019*
Female	17	53.1	15	46.9	32		
Marital status							
Single	20	83.3	4	16.7	24		
Married	110	67.9	52	32.1	162	4.155	0.245
Divorcee	8	88.9	1	11.1	9		
Widowed	3	60	2	40	5		
Occupation							
Employee	56	58.9	39	41.1	95		
Unemployed	48	60.8	31	39.2	79	0.911	0.634
Retired	18	69.2	8	30.8	26		
Level of education							
Illiterate	21	52.5	19	47.5	40		
Reads and writes	58	65.9	30	34.1	88		
preparatory School	3	75	1	25	4	16.24	0.003*
High school	37	84.1	7	15.9	44		
University	22	91.7	2	8.3	24		
Residence							
Urban	58	76.3	18	23.7	76	1.994	0.158
Rural	83	66.9	41	33.1	124		
Economical Status							
Below average	24	66.7	12	33.3	36		
Average	96	68.6	44	31.4	140	3.84	0.147
above average	21	87.5	3	12.5	24		
Hospital name							
Health insurance hospital	71	71	29	29	100		
						8.449	0.015*
University Hospital	26	52	24	48	50		
Student Hospital	25	50	25	50	50		

>0.05 Non significant   <0.05* significant   <0.001** High significant

Table (6) : Relation between socio of studied subjects and their adherence

	The GR-SMAQ-HD scale						
	Adherence		In-adherence		Total	Chi-square	
	N	%	N	%		X2	P-value
Age							
21-30	18	90	2	10	20		
31-40	23	82.1	5	17.9	28	16.736	<0.001**
41-50	34	85	6	15	40		
51-60	66	58.9	46	41.1	112		
Sex							
Male	124	73.8	44	26.2	168	5.53	0.019*
Female	17	53.1	15	46.9	32		
Marital status							
Single	20	83.3	4	16.7	24		
Married	110	67.9	52	32.1	162	4.155	0.245
Divorcee	8	88.9	1	11.1	9		
Widowed	3	60	2	40	5		
Occupation							
Employee	56	58.9	39	41.1	95		
Unemployed	48	60.8	31	39.2	79	0.911	0.634
Retired	18	69.2	8	30.8	26		
Level of education							
Illiterate	21	52.5	19	47.5	40		
Reads and writes	58	65.9	30	34.1	88		
preparatory School	3	75	1	25	4	16.24	0.003*
High school	37	84.1	7	15.9	44		
University	22	91.7	2	8.3	24		
Residence							
Urban	58	76.3	18	23.7	76	1.994	0.158
Rural	83	66.9	41	33.1	124		
Economical Status							
Below average	24	66.7	12	33.3	36	3.84	0.147

Discussion

Hemodialysis treatment is the most common type of renal replacement and a lifesaving procedure for patients with end stage kidney disease. Although 3 times 4 hours weekly dialysis equal less than 10% of normal renal clearance, so the patients are exposed to some problems and adverse effects. Also, the patients with ESRD need to be adherent to the therapeutic regimen which include adherence to the prescribed medications, diet, and fluid restriction, and attendance of hemodialysis sessions, non-adherence to the prescribed regimen is a a3sociated with increased morbidity and mortality [31-33].

Adherence to treatment and management recommendations is essential for optimal health and survival of persons with ESRD. It is necessary to educate patients with chronic disease like chronic renal failure in order to improve their quality of life in long-term. Unfortunately, poor patient adherence to haemodialysis is a prevalent problem in health care that has considerable medical, social and economic consequences, predominantly among patients undergoing hemodialysis . it was revealed that non adherence to treatment negatively affects patient outcomes and increases healthcare expenses . Not only patients themselves are affected, but non-adherence behavior influences the normal work-load of the haemodialysis unit [34,35].

Regarding to socio demographic characteristic of the studied patients. According to the current study's findings , more than half of patients having hemodialysis were between the ages of group ranged from 51 to 60 years .This may be attribute to most people in their late 50 or older , their risk for ESRD is increased due to presences of some disease such as hypertension , diabetes mellitus and prostatic enlargement . And   ESRD dramatically increases with aging, particularly after the age of 50 year. This result was in the same line with **Arbagy et al. (2015)** [36] in a study Prevalence of end stage renal disease in Menoufia Governorate , in Egypt reported that the mean age of the hemodialysis patient was 52 years.

On other hand, this finding   was contradicted with **Elmoghazy et al. (2016)**[37] in a study to Nursing intervention for enhancing hemodialysis patient adherence to therapeutic regimen .Who reported that the present study revealed that less than one half of the study subjects their age was less than 40 years. This finding might be due to that ESRD is more   common   among   the   middle adulthood persons.

In relation to gender, the current study results revealed that the majority of studied patients were male this because the load of the working and associated stress and may be related to the life style of most men and Farmers' job among the Egyptian males makes them at risk for interstitial nephritis due to the exposure to agrochemicals, dehydration and consumption of contaminated water. add to that, male older adults are at risk for benign prostatic hypertrophy which may lead to reflux of the urine to the kidney and compromise the kidney functions .This finding was in accordance with **Sharaf et al. (2016)** [38] in a study The impact of educational interventions on hemodialysis patients adherence to fluid and sodium restrictions who reported that more than half of subjects were male and develop ESRD more than females , Also , this result was supported by **Makusidi et al. (2014)** [39] in a studied Hemodialysis performance and outcomes among end stage renal disease patients and mentioned that ESRD predominantly affect males more than females .

On other hand, this finding was contradicted with **Vafaei et al. (2017)** [40] and **Mousavi1 et al. (2015)** [41] they illustrated that majority of studied patients were female .They explain that the women under hemodialysis have lower scores of quality of life and higher risk of death when compared to men. This is associated with the maintenance of the function of providing care to the home and children.

Concerning to their adherence to treatment regimen, the current study result revealed that the majority of studied patients no stop taking your medications if feel bad your condition deteriorates .This finding was consistent with **Tan et al. (2014)** [42] they mentioned that the majority of studied patient. When you feel bad , have you ever discontinued taking your medication ? In the study results from the translation and cultural adaptation of the geek simplified medication adherence questionnaire in patients with lung cancer. **In relation to forget to take medicines**, the current study results revealed that four fifth of studied patients didn't forget to take medicines. This finding was in agreement with **Lam et al. (2015)** [43] in a study medication adherence measures: an overview. Bio Med Research International who ask have you ever forgotten to take your medication? Who reported in the study more than half no forgotten to take your medication? **As regards to forget to take your medications during the time between two dialysis sessions**, **the** study result revealed that nearly more than three quarters of studied patients didn't forgot to take their medications during the time

between two dialysis sessions. This finding in agreement with **Culig et al. (2014)** [44] in a study from Morisky to Hill bone; self-reports scales for measuring adherence to medication. Who ask have you ever forgotten to take your medications during the time interval between two dialysis sessions? Who reported in the study nearly four fifth didn't forgot to take their medications during the time between two dialysis sessions.

Concerning to level of the GR-Simplified Medication Adherence Questionnaire –Hemodialysis (GR-SMAQ-HD) scale among studied subjects. The results of the study revealed that only around less than two third of the patients on Hemodialysis adhered to the Greek simplified medication adherence. This finding in agreement with **Maanen et al. (2015)** [45], in a study Adherence with dosing guideline in patients with impaired renal function at hospital discharge who reported that about less than two third of the studied participants adherence to CKD medications.

Correlation between studied patient's total knowledge score and adherence. The present study demonstrated that there was highly positive significant correlation between knowledge score and adherence. This finding was consistent with study

done by **Sayed et al. (2013)** [46], in study Effect of the Patient's knowledge on peritonitis rates in peritoneal dialysis who demonstrated that knowledge was strongly associated with adherence to the ESKD treatment regimen .

Relation between studied patient's total knowledge score and the GR-SMAQ-HD scale. The study revealed that, the majority of studied patients had good knowledge and adherence with the GR-SMAQ-HD scale these include adherence with medication, follow up, fluid restrictions and dietary instructions. This explain that high significant correlation between the knowledge and adherence p-value was <0.05 .This finding was consistent with study done by **Victoria et al. (2019)** [47], in study the impact of education on knowledge, adherence and quality of life among patients on hemodialysis who demonstrated that significant correlation between the knowledge and adherence.

Also relation between studied patient's total knowledge and adherence with dietary instructions , the study revealed less than two third had good knowledge and adherence with dietary instructions .they explain that adherence to the ESKD treatment regimen was strongly associated with knowledge . This finding was consistent with study done by **Estrella et**

al. (2013) [48], who reported that significant increase in the level of their patients' knowledge in relation to the diet restrictions.

Relation between socio of studied subjects and their adherence. The study revealed that less than three fourth of studied patients who had adherence were male , while nearly less than half patients had in-adherence were female ,The majority of ESRD participants were males rather than females . So gender was significantly associated with adherence to therapeutic regimen .This finding in line with **Naalweh et al. (2017)** [15] in study treatment adherence and perception in patients on maintenance hemodialysis were reported that male patients had significantly higher overall adherence scores than females.

On other hands contradicted with **Duong et al. (2015)** [49] in study challenges of hemodialysis in Vietnam: Experience from the first standardized district dialysis unit who revealed in the study that female were representing more than the males and who mention that gender was not associated with adherence to hemodialysis.

Conclusion

Based on the findings of the present study, it can be concluded that: In patients with chronic kidney diseases, dialysis is a critically important treatment that prolongs the survival time and improves the quality of life. Dialysis facilitates the excretion or removal of the toxic and harmful metabolic wastes from the human body. However, the poor compliance of patients might negatively influence its effects. Patients can be not adherent with different aspects of their treatment, which includes medications, treatment regimens, and dietary restrictions. To minimize non-adherence, assessment needs to focus on both patient factors and the extent to which relationships and system problems compromise the patient's ability to adhere to medication and treatment plans**.**

There was highly positive significant correlation between knowledge and adherence of studied patients, the results revealed that studied patients with good knowledge score appeared adherence with the GR-SMAQ-HD scale, while studied patients who had poor knowledge appeared In-adherence with the GR-SMAQ-HD scale include In-adherence with

(medication , follow up , fluid restrictions and dietary instructions).

- The study also revealed that, there were certain factors that influence the

knowledge and adherence of studied patients as in age, sex, marital status, level of education, residence and economical Status.

- Finally, overall findings revealed that good knowledge to the patient Undergoing Hemodialysis, improve adherence with their therapeutic Regimen.

Recommendations

Based upon the findings of this study, the following recommendations are derived and suggested:

Recommendation for patients:

- Counseling should be provided for all patients who are undergoing Hemodialysis that helps in preparation of them and give advice in adherence of therapeutic regimen.

Recommendation for clinical practice:

- Assessment of patient's knowledge about hemodialysis must be done upon patient admission by nurses using (Tool I).

- Assessment of patient's knowledge about renal failure and hemodialysis regarding definition, purposes, side effect, investigation. Treatment regimen including diet and fluid restrictions, medication adherence, importance of adhering to hemodialysis sessions , care of blood access site must be done in the initial data collection and be documented in patients file by nurses using (Tool II).

- Assessment of patient's level of adherence to hemodialysis regimen by nurses using (Tool III).

Recommendations for administration:

- Written policies and guide lines should be available regarding increasing knowledge and adherence of therapeutic regimen for patients undergoing hemodialysis.

- Provision of colored booklet regarding physical and psychological preparation before Hemodialysis procedure.

- Multi-disciplinary team should be available to provide individualized information and support for each patient.

Recommendation for further research studies:

- Replication of the study on a larger random sample which is acquired from different geographical areas in Egypt to better clarify the main aspects of this problem.

References

1. Madero A , Garcia F, Sanchez L. Pathophysiologic insight into Meso American Nephrpathy . Curr Opin Nephrol Hypertens. 2017**;** 26 (4): 296 -3012.

2. Sen A, Callisen H, Libricz S, Patel B. Complications of solid organ transplantations : Cardiovascular , nurologic , renal and gastrointestinal . Crit Care Clin . 2019; 35 (1): 169 –86.

3. Janssen I , Gerhardus A , Von Gersdorff G, Baldamus C, Schaller M, Barth C. Preferences of patients undergoing hemodialysis - results from a questionnaire-based study with 4,518 patients. Patient Prefer Adherence. 2015; 9 (1): 847-55.

4. Hall J, Do Carmo J, da Silva A, Wang Z, Hall M. Obesity, kidney dysfunction and hypertension: Mechanistic links. Nat Rev Nephrol. 2019; 15(6): 367–85.

5. Liyanage T, Ninomiya T, Jha V, Neal B, Patrice H, Okpechi I. Worldwide access to treatment for end-stage kidney disease: A systematic review . 2015 ؛385 (1):1975–8.

6. Vanholder R, Annemans L and Brown E. Reducing the costs of chronic kidney disease while delivering quality health care: a call to action. Nature Reviews Nephrology. 2017; 13(7): 393 – 5

7. Ghonemy T, Farag S, Soliman S, El-okely A, El-hendy Y. Epidemiology and risk factors of chronic kidney disease in the El-Sharkia Governorate ; Egypt. Saudi J Kidney Dis. Transpl. 2016; 27 (1): 111–17.

8. Senosy S, El Shabrawy E. Hepatitis C virus in patients on regular hemodialysis in Beni-Suef Governorate; Egypt. J Egypt Public Health Assoc. 2016; 91 (1): 86–9.

9. Ware J, Richardson M, Meyer K. Improving CKD-specific patient-reported measures of health-related quality of life. J Am Soc Nephrol . 2019; 30 (1): 664–77.

10. Chan C, Blankestijn P, Dember L. Dialysis initiation, modality choice , access, and prescription; conclusions from a kidney disease; improving global outcomes (kdigo) controversies conference . Kidney Int . 2019; 96(1): 37–47 .

11. Canaud B, Vienken J, Ash S. Hemodiafiltration to address unmet medical needs ESKD patients. Clin J Am Soc Nephrol . 2018; 13(1): 1435–43.

12. Saha M, Allon M. Diagnosis, treatment and prevention of hemodialysis emergencies. Clin J Am Soc Nephrol . 2017; 12 (1): 357–69.

13. Alikari V, Matziou V, Tsironi M, Kollia N, Theofilou P . A modified version of the Greek simplified medication adherence questionnaire for hemodialysis

patients. Health Psychol Res. 2017 ; 5(1): 6647-5 .

14. Karam S , Mohammad A , Moutaz W, Samah W, Waleed M . Treatment adherence and perception in patients on maintenance hemodialysis: A cross- sectional study from Palestine. BMC Nephron. 2017; 18 (1):178 -5.

15. Naalweh M , Barakat M , Sweileh S , Al-Jabi W, Sweileh,W, Zyoud, S . Treatment adherence and perception in patients on maintenance hemodialysis; A cross -sectional study from Palestine. BMC Nephrology. 2017; 18 (1): 178 -5.

16. Chironda G, Bhengu B. Contributing factors to non-adherence among chronic kidney disease (ckd) patients: A systematic review of literature. Med Clin Rev. 2016; 2(1): 29 - 5.

17. Galal I , Mohammad Y , Nada A, Mohran Y. Medication adherence and treatment satisfaction in some Egyptian patients with chronic obstructive pulmonary disease and bronchial asthma . Egyptian Journal of Bronchology . 2018; 1(12):1- 33.

18. Sampaio R, Azevedo L, Dias C, Horne R, Castro L. Portuguese version of the medication adherence report scale (MARS-9): validation in a population of chronic pain patients. J Eval Clin Pract. 2019; 25(2): 346–52 .

19. Burnier M , Pruijm M , Wuerzner G, Santschi V . Drug adherence in chronic kidney diseases and dialysis. Nephrol Dial Transplant. 2015; 30 (1): 39 -44.

20. Milazi M, Bonner A, Douglas C. Effectiveness of educational or behavioral interventions on adherence to phosphate control in adults receiving hemodialysis: A systematic review. JBI Database System Rev Implement Rep. 2017; 15 (1): 971–1010.

21. Brown M, Bissell J. Medication adherence: WHO cares? Mayo Clinic Proceedings. 2011; 86(4): 304–14.

22. Davison I, Cooke S. How nurses' attitudes and actions can influence shared care. J Ren Care. (2015); 41 (1): 96-103.

23. Oils C, Maciejewski M, Hoyle R, Reeve B, Gallagher P, Bryson C, et al. Initial validation of a self-report measure of the extent of and reasons for medication non-adherence. Medical Care. 2012; 50 (1):1013 -5.

24. Marcum Z, Sevick M, Handler S. Medication non-adherence: A diagnosable and treatable medical condition. JAMA . 2013; 309 (1): 2105–6.

25. Ahmed A , Mohd F , Allam E , Habil A , Metwally N , Ibrahiem M, et al. Development of practice guidelines for hemodialysis in Egypt National Research Center. Faculty of Medicine, Ain Shams University. 2010; 20 (4): 193- 202.

26. Denhaerynck K , Manhaeve D , Dobbels F, Garzoni D, Nolte C , DeGeest S. Prevalence and consequences of non-adherence to hemodialysis regimens . American Journal of Critical Care. 2011; 16(3): 222-35.

27. Solomon M, Mujumdar S. Primary non-adherence of medications; Lifting the veil on prescription-filling behaviors. Journal of General Internal Medicine. 2010; 25 (4): 280–81.

28. Ghonemy T , Farag S , Soliman S , El-okely A , El-hendy Y. Epidemiology and risk factors of chronic kidney disease in the El-Sharkia Governorate , Egypt .Saudi J Kidney Dis Transpl . 2016; 27 (1):111-7.

29. Ai-Li M, Tan Y. The effect of systematic health education on the treatment compliance for patients with maintenance hemodialysis. Chin J Dial Art if Organs. 2011; 2 (1) : 34–36 .

30. Karam S, Mohammad A, Moutaz W, Samah W, Waleed M. Treatment adherence and perception in patients on maintenance hemodialysis: A cross - sectional study from Palestine. BMC Nephrol. 2017; 18(1):178 -5.

31. Ware J, Richardson M, Meyer K. Improving CKD-specific patient-reported measures of health-related quality of life. J Am Soc Nephrol. 2019; 30 (1): 664–77.

32. Chan C, Blankestijn P, Dember L. Dialysis initiation, modality choice, access, and prescription; conclusions from a kidney disease; improving global outcomes (kdigo) controversies conference. Kidney Int. 2019; 96(1): 37–47.

33. Canaud B, Vienken J, Ash S. Hemodiafiltration to address unmet medical needs ESKD patients. Clin J Am Soc Nephrol. 2018; 13(1) 1435–43.

34. Saha M, Allon M. Diagnosis, treatment and prevention of hemodialysis emergencies. Clin J Am Soc Nephrol . 2017; 12: 357–69.

35. Wee A, Said M, Redzuan A. Medication adherance status among rheumatoid patients. International

Journal of Pharmacy and Pharmaceutical Sciences. 2016; 8(7): 317-21.

36. El-Arbagy R, Kora E, El-Barbary, Gabr S, Selim A. Prevalence of end stage renal disease in Menoufia Governorate. Nat Sci. (2015); 13(6): 154-8.

37. Elmoghazy G, Hassan S, Sorour A, Donia A. Nursing intervention for enhancing hemodialysis patient adherence to therapeutic regimen . J Am Sci . 2016; 12(11): 84-93. ISSN 1545-1003 (print); ISSN 2375-7264 Available from: http://www.jofamericanscience.org.8.

38. Sharaf A. The impact of educational interventions on hemodialysis patients' adherence to fluid and sodium restrictions. Journal of Nursing and Health Science 2016; 5 (3): 50-60.

39. Makusidi M , Liman H , Yakubu A , Isah M, Abdullahi S, Chijioke A . Hemodialysis performance and outcomes among end stage renal disease patients from Sokoto, North-Western Nigeria. Indianjournal of Nephrology. 2014; 24(2): 82-85 .

40. Vafaei A, Nobahar M. The care preferences of patients under hemodialysis. J Renal Inj Prev. 2017; 6(3): 210-15.

41. Mousavi1 S , Zeraati A , Moradi1 S, Mousavi M .The Effect of Gabapentin on muscle cramps during hemodialysis : A Double-blind Clinical Trial . Saudi J Kidney Dis Transpl . 2015; 26(6):1142-1148.

42. Tan X, Chang J. Review of the four item Morisky Medication Adherence Scale (MMAS-4) and eight item Morisky Medication Adherence Scale (MMAS-8). University of Minnesota, College of Pharmacy. 2014 Available from: http://hdl.handle.net/11299/171823

43. Lam W, Fresco P. Medication adherence measures: an overview. Bio Med Research International 217047, 2015. Doi.10(1155):217047 -5

44. Culig J, Leppée M. From morisky to hill bone; Self reports scales for measuring adherence to medication. Collegium Antropologicum. 2014; 38(1): 55-62.

45. Maanen D, Marum V, Jansen P, Zwart J, Solinge V, Egberts T. PlosOne Journal . 2015; 10(6) : e0128237 -5 .

46. Sayed S, Abu-Aisha H, Ahmed M, Elamin S. Effect of the patient's knowledge on peritonitis rates in peritoneal dialysis. Perit Dial Int. 2013; 33(4): 362–6 .

47. Victoria A, Maria T, Sofia Z. The impact of education on knowledge, adherence and quality of life among patients on hemodialysis., Springer 2019; 28 (1) : 73 -83.

48. Estrella M , Jaar B , Cavanaugh K , Fox C , Perazella M , Soman S . Perceptions and use of the National Kidney Foundation KDOQI guidelines: A survey of U.S. renal healthcare providers. BMC Nephrology. 2013; 14 (1) : 230– 5.

49. Duong C , Olszyna D , Nguyen P , McLaws   M. Challenges of hemodialysis in Vietnam: Experience from the first standardized district dialysis unit in Ho Chi Minh City. BMC Nephrology. 2015; 16(1): 122 -5.