

Adherence With Therapeutic Regimen Among Chronic Renal Failure Patients Undergoing Maintenance Hemodialysis

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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 university hospitals, Saudi Arabia. **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 .

Keywords: Hemodialysis, Adherence, Therapeutic Regimen.

Introduction

Chronic kidney disease (CKD) is an irreversible, progressive condition that, if left untreated, can result in end-stage renal disease (ESRD) or kidney failure. People with chronic kidney disease (CKD) have a low quality of life, financial hardship, and major life changes that impact their family due to the chronic nature of the disease and its potentially dangerous complications. Extreme poverty, limited access to healthcare, and a diverse population that makes standardized health education challenging, if not impossible, due to cultural, value, and belief variations all contribute to the devastating effects of chronic kidney disease (Madero et al., 2017; Sen et al., 2019).

Chronic renal failure is a serious health concern in many regions of the world. Its issues are both personal and national; it raises the risk of cardiovascular disease and can lead to a high global mortality rates. This condition is characterized by kidney injury or a decreased glomerular filtration rate (GFR) that lasts for three months or more (Janssen et al., 2015; Hall et al., 2019).

Worldwide, the prevalence of end-stage renal disease is rising. The burden on health systems is growing as a result of kidney transplantation and renal replacement treatment (RRT). In developing nations with few health resources, this illness is very severe (Liyanage et al., 2015).

Chronic kidney disease (CKD) is a serious health issue in the Kingdom of Saudi Arabia (KSA). In KSA, there are currently over 20,000 patients on dialysis and 9,810 patients undergoing follow up after kidney transplantation. The combined prevalence of renal replacement therapy in Saudi Arabia is estimated at 294.3 per million populations. In Saudi Arabia, the age-standardized prevalence of CKD (stages 1–2, stage 3, stage 4, and stage 5, not including renal replacement therapy) is estimated at 9,892 per 100,000, which is higher than the estimates for Western Europe (5,446 per 100,000) and North America (7,919 per 100,000) (Alsuwaida et al., 2010; Saudi Center for Organ Transplantation; Mousa et al., 2021).

The most popular kind of renal replacement therapy and alternative treatment for people with chronic renal failure is hemodialysis. For individuals with end-stage kidney disease, it is a life-saving treatment. Patients who filter waste and eliminate excess fluids and electrolytes have a better chance of surviving (Ware et al., 2019; Chan et al., 2019). As a result, patients must follow the treatment plan, which includes taking their medications as directed, following their diet, limiting their fluid intake, and attending hemodialysis sessions. Hemodialysis patients frequently struggle with non-adherence to the recommended regimen, which is linked to higher rates of morbidity and death (Canaud et al., 2018; Saha et al., 2017).

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 (Alikari et al., 2017; Karam et al., 2017).

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 (Naalweh et al., 2017).

The National Kidney Foundation-Kidney Disease Outcomes Quality Initiative (NKF-KDOQI) states that non-adherence to pharmacy treatment, skipping or reducing the duration of HD sessions, and consuming excessive amounts of fluids and foods high in potassium and phosphorus are all examples of non-adherence in HD. Under hemodialysis, end-stage renal disease (ESRD) is a chronic condition that prevents people from leading normal lives. There are many different factors that affect HD patient adherence, including treatment-, condition-, health system-, and socioeconomic-related factors (Chirona et al., 2016).

There is some overlap among the primary categories of non-adherence, which are undeniable. The first kind is primary non-adherence, which is also known as non-fulfillment adherence and occurs when doctors write prescriptions but the drug is never filled or started. Patients who choose to discontinue taking a drug after beginning it without a doctor's advice constitute a second category of non-adherence known as non-persistence. This is rarely deliberate and occurs when there is a misunderstanding between the patient and the clinician over treatment plans. Non-conforming behavior, which encompasses a range of methods of not taking drugs as directed, is the third category of non-adherence. This behavior might include missing doses or taking prescriptions inconsistently (Galal et al., 2018; Sampaio et al., 2019; Burnier et al., 2015). 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 (Milazi et al., 2017).

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

Setting of the study:

This study was conducted in dialysis Unit at University Hospitals, Saudi Arabia

Subjects:

A convenience sample of 200 adult patients with CRF admitted to Hemodialysis Units at the above mentioned setting 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 or carcinoma .

Data collection tools:

Three tools were used at this study after reviewing the relevant literature (Brown et al., 2011; Davison et al., 2015; Oils et al., 2012; Marcum et al., 2013; Ahmed et al., 2010, Denhaerynck et al., 2011) ⁽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 (Ahmed et al., 2010, Denhaerynck et al., 2011), 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 sociodemographic 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 (Solomon et al., 2010; Ghonemy et al., 2016; Ai-Li et al., 2011; Karam et al., 2017) 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 from 75% 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), to assess level of patient adherence to hemodialysis regimen. It 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:

Official permission was done and permission was received

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.

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Content validity:

- All tools of the study were reviewed for content validity

- 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 conducted on 10% (20) hemodialysis patient in Hemodialysis Unit to test the clarity, feasibility and applicability of the different items of the deterrent tools

Data collection:

Data collection duration period was 6 months started from first of January to the end of June 2024. 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 importance 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 chosen 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 adulthood 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.

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

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.

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

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.

The GR-SMAQ HD scale	N	%
Adherence	122	61

non-adherence	78	39
Total	200	100

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 .

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	$<0.001^{**}$

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 .

	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		

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 differenceamong studied patients betweenknowledge 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 wereemployee, while less than half (41.1%) hadin-adherence. It was found that, there wasa 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**

	The GR-SMAQ-HD scale						Chi-square	
	Adherence		In-adherence		Total	X2	P-value	
	N	%	N	%				
Age								
21-30	18	90	2	10	20	16.736	<0.001**	
31-40	23	82.1	5	17.9	28			
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	4.155	0.245	
Married	110	67.9	52	32.1	162			
Divorcee	8	88.9	1	11.1	9			
Widowed	3	60	2	40	5			
Occupation								
Employee	56	58.9	39	41.1	95	0.911	0.634	
Unemployed	48	60.8	31	39.2	79			
Retired	18	69.2	8	30.8	26			
Level of education								
Illiterate	21	52.5	19	47.5	40	16.24	0.003*	
Reads and writes	58	65.9	30	34.1	88			
preparatory School	3	75	1	25	4			
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
Average	96	68.6	44	31.4	140		
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		

Discussion

For individuals with end-stage kidney disease, hemodialysis is a life-saving therapy and the most popular form of renal replacement. Even though three times four hours of dialysis per week is less than 10% of normal renal clearance, patients still run the risk of experiencing some issues and negative side effects. Additionally, patients with end-stage renal disease (ESRD) must follow their treatment plan, which includes taking their medications as directed, following their diet and fluid restrictions, and attending their hemodialysis sessions. Non-compliance with the recommended plan is a common issue in hemodialysis and is linked to higher rates of morbidity and mortality (Ware et al., 2019; Chan et al., 2019; Canaud et al., 2018).

Following treatment and management guidelines is crucial for ESRD patients' survival and best possible health. Long-term quality of life improvement for individuals with chronic conditions, such as chronic renal failure, requires education. Unfortunately, hemodialysis patients are primarily affected by poor patient adherence, a widespread issue in healthcare that has serious medical, social, and financial repercussions. It was discovered that treatment noncompliance raises healthcare costs and has a detrimental impact on patient outcomes. Patients are not the only ones impacted; non-adherence behavior also affects the hemodialysate unit's typical workload (Saha et al., 2017; Wee et al., 2016). 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) who reported that the mean age of the hemodialysis patient was 52 years.

However, this result was in conflict with Elmoghazy et al. (2016), who stated that the current study showed that less than half of the study participants were under 40 years old. This finding may be because middle-aged individuals are more likely to have ESRD.

Regarding gender, the current study's findings showed that, as a result of the stress of their jobs, the majority of the patients were men. Furthermore, male older persons are susceptible to benign prostatic enlargement, which can impair kidney function and cause urine to reflux. This conclusion was consistent with Sharaf et al. (2016), who found that over half of the subjects were men and that men were more likely than women to get ESRD. Makusidi et al. (2014) also confirmed this results, stating that men are more likely than women to be affected by ESRD.

However, Vafaei et al. (2017) and Mousavi et al. (2015) showed that the majority of the patients under study were female, which refuted this finding. They clarify that, in comparison to men, women receiving hemodialysis have a higher chance of dying and lower quality of life scores. This is related to maintaining the role of caring for the children and the house.

The current study's findings regarding treatment adherence showed that most patients did not stop taking their medications if they felt their health worsened. Tan et al. (2014) noted that the majority of the patients under study were in agreement with this finding. Have you ever stopped taking your medication when

you're feeling down? The findings of a study that translated and culturally adjusted the geek simplified medication adherence questionnaire for lung cancer patients.

In relation to forget to take medicines, the current study results revealed that fourfifth of studied patients didn't forget totake medicines. This finding was inagreement with Lam et al. (2015) who ask have you ever forgotten to takeyour medication? Who reported in thestudy more than half no forgotten to take your medication? As regards to forget totake your medications during the timebetween two dialysis sessions, the study result revealed that nearly more than threequarters of studied patients didn't forgot to take their medications during the time between two dialysis sessions. This findingin agreement with Culig et al. (2014) Who ask have you ever forgotten to take your medications during the time interval between two dialysis sessions? Who reported in the study nearlyfour fifth didn't forgot to take their medications during the time between two dialysis sessions. Concerning to level of the GR-Simplified Medication AdherenceQuestionnaire–Hemodialysis (GR-SMAQ-HD) scale among studiedsubjects. The results of the study revealed that only around less than two third of the patients on Hemodialysisadhered to the Greek simplifiedmedication adherence. This finding inagreement with Maanen et al. (2015),who reported that aboutless than two third of the studiedparticipants 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), who demonstrated that knowledge was strongly associated with adherence to the ESKD treatment regimen .

correlation between the GR-SMAQ-HD scale and the total knowledge score of the patient under study. According to the study, most of the patients had good awareness of and compliance with the GR-SMAQ-HD scale, which includes following dietary guidelines, drug regimens, and follow-up. This explains why there was a high significant connection (p -value <0.05) between knowledge and adherence. This result was in line with research by Victoria et al. (2019), which showed a strong link between adherence and knowledge.

Additionally, the study found that less than two thirds of the patients had high understanding and adherence to dietary advice relative to their overall knowledge. They clarify that knowledge was closely linked to compliance with the ESKD treatment plan. This result was in line with a 2013 study by Estrella et al., which found that patients' knowledge of the dietary limitations had significantly increased.

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) werereported that male patients hadsignificantly higher overall adherencescores than females. Contrary to this, Duong et al. (2015) found that women made up a larger proportion of the study's participants than men did, and they also noted that adherence to hemodialysis was unrelated to gender.

Conclusion

Based on the current study's findings, the following conclusions can be drawn: Dialysis is a vital treatment that increases survival and enhances quality of life for patients with chronic renal illnesses. Dialysis makes it easier for the body to eliminate toxic and dangerous metabolic wastes. However, its effects may be adversely affected by patients' poor compliance. Medication, treatment plans, and food restrictions are just a few of the parts of treatment that patients may not follow. Assessment must concentrate on patient characteristics as well as the degree to which interpersonal connections and systemic issues jeopardize the patient's capacity to follow prescription and treatment regimens in order to reduce non-adherence.

There was a strong positive correlation between the patients' knowledge and adherence. The findings showed that patients with high knowledge scores showed adherence to the GR-SMAQ-HD scale, while those with low knowledge scores showed in-adherence to the scale, which includes medication, follow-up, fluid restrictions, and dietary instructions.

The study also found that some characteristics, such as age, sex, marital status, educational attainment,

place of residence, and economic position, have an impact on the knowledge and adherence of the patients under study.

Ultimately, the results showed that patients receiving hemodialysis who have strong awareness of their treatment regimen stick to it better.

Recommendations

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

- 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.
- 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).

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