

## Effect of Designed Educational Nursing Intervention on Knowledge and Compliance to Therapeutic Regimen among Patients with Hemodialysis

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**Abstract: Background:** Dialysis is imperative for patients with end-stage renal disease; however, compliance ensures its efficacy. Nursing intervention has been considered to improve compliance. Purpose to examine the effect of designed educational nursing intervention on knowledge and compliance to therapeutic regimen among patients with hemodialysis. **Setting:** The study was carried out at the hemodialysis unit in Menoufia University and Shebin El-Kom Teaching Hospitals. **Sampling:** A consecutive sample of 100 adult patients on hemodialysis were selected and divided alternatively into two equal groups: 50 patients for each group (study - control). **Instruments:** Two instruments were used for data collection: Structured interview questionnaire, and compliance assessment data sheet. **Results:** It is revealed that pre intervention, mean total knowledge scores were  $8.04 \pm 3.746$  and  $8.00 \pm 3.714$  among study and control groups respectively. While 3 months post intervention, the mean total knowledge scores show higher statistically significant difference in improvement among study group than control group recording  $37.32 \pm 6.195$  and  $8.96 \pm 4.035$  respectively. The minority of study group and control group (14%) comply to therapeutic regimen preintervention that was increased three months post intervention to (86%) among study group compared to control group. **Conclusion:** Educational nursing intervention was effective in improving compliance and knowledge among patients with hemodialysis. **Recommendation:** Monthly compliance progress report should be initiated in the hospital by the dialysis nurse to discuss patient's non-adherence behaviors also continuous counseling sessions and motivation should be provided to help patients in complying with therapeutic regimen.

**Key words:** compliance, educational nursing intervention, hemodialysis.

### Introduction

Chronic kidney disease (CKD) is recognized as an important global

public health concern as it significantly contributes to health care expenses,

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morbidity as well as mortality from non-communicable disease (Gaitonde et al., 2017).

The estimated global number of individuals affected by kidney disease exceeds 850 million with 843.6 million accounted for by chronic kidney disease (Jager et al., 2019). Chronic kidney disease resulted in 1.2 million deaths and was the 12th leading cause of death worldwide (Caplin et al., 2017).

Chronic kidney disease pass through five stages and at end stage renal replacement therapy (RRT) through either dialysis or renal transplantation is necessary for survival (Esterman, 2017). Hemodialysis (HD) is defined as a procedure used to manage patients with end stage renal disease (ESRD) through using artificial kidney machine to substitute the failed kidneys' functions (Arad et al., 2021).

Adherence to the therapeutic regimen is central and paramount to achieving optimal, effective, and successful HD outcomes. However, failure to adhere to the hemodialysis regimen can lead to serious and occasionally fatal conditions, such as hypertension, muscle cramps, arteriovenous fistula (AVF) blockage, dyspnea associated with pulmonary edema, or heart attack due to hyperkalemia, and can lead to poor quality of life, decreased life expectancy, increased morbidity, mortality, and a higher cost and burden on the health care system (Suganthi et al., 2019).

The process of adherence to treatment in hemodialysis method includes diet, fluid intake, drug management, participation in dialysis sessions and completion of sessions (Naalweh et al., 2017). Excessive fluid intake leads to shortness of breath, headache, abdominal distension, edema, hypertension and heart failure (Wang et al., 2017). It also causes disorders in cognitive functions, an increase in

hospitalization and mortality (Naalweh et al., 2017).

Incompatibility in each dietary component causes different problems in patients. The lack of compliance with sodium intake causes excessive fluid intake and associated increase in total body fluid and interdialytic weight; incompatibility in phosphorus intake causes disorders in mineral metabolism and cardiovascular diseases; incompatibility in potassium intake causes arrhythmias and increase in mortality; and incompatibility in protein intake causes complications and increase in mortality due to increase in urea (Ko et al., 2017).

Medication and dietary non-adherence in hemodialysis patients could lead to serious negative consequences including poor health outcomes and increased morbidity and mortality (Milazi et al., 2017).

Participation in hemodialysis sessions and completion of sessions are important in removing waste products and fluid from the body. Failure to attend a single session leads to increase in hospitalization rate and mortality in individuals within 30 days. The prevalence of incompatibility to session attendance or shortened session was found to be 7-32% (Gray et al., 2017).

Nursing intervention consists of the application of behavioral, educational, cognitive and dietary techniques that has been known to had positive effects on the emotional and physical health of patients with end stage renal disease. Hence, evidence based therapeutic nursing interventions, that are cost effective and readily accessible are vital for facilitating adherence behavior (Wang et al., 2017).

### **Significance of the study**

Noncompliance to the prescribed treatment schedule is a common problem in hemodialysis (HD)

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patients, and is associated with increased morbidity and mortality. Studies have shown that the prevalence of noncompliance to fluid restriction ranged from 30- 70%. Also, estimates of noncompliance to the dietary regimen ranged from 2 - 34% of patients for potassium intake and from 19 - 57% for phosphate intake. Noncompliance to medications is a major concern in HD patients as recent studies have shown that 19 - 99% of patients were non-adherent to their medications. Noncompliance through skipping dialysis sessions varied from 7 - 32% among chronic HD patients (Ibrahim et al., 2015). Therefore, the current study was carried out to investigate the effect of designed nursing education on knowledge and compliance to therapeutic regimen among patients with hemodialysis.

### **Purpose:**

The purpose of the current study was to examine the effect of a designed educational nursing intervention on knowledge and compliance to therapeutic regimen among patients with hemodialysis.

### **Research Hypotheses**

The following research hypotheses were formulated to achieve the purpose of the study: -

1. Patients in the study group who receive designed educational nursing intervention will have higher knowledge score than patients who didn't (control group).
2. Patients in the study group who receive designed educational nursing intervention will have higher compliance score than patients who didn't (control group).

### **Methods**

#### **Research design:**

A quasi-experimental research design (study and control) was utilized to achieve the purpose of this study.

#### **Setting:**

The study was conducted at hemodialysis unit in Menoufia University and Shebin El-Kom teaching hospitals.

#### **Sampling:**

A consecutive sample of 100 adult patients on hemodialysis were assigned randomly and alternatively into two equal groups, 50 patients for each group. Group one was the study group. They received the designed educational nursing intervention along with routine hospital care. Group two was the control group. They only received routine hospital care.

#### **Inclusion criteria:**

**The study subjects were selected**

**according to the following criteria:**

- Adult patients (18 - 65 years old).
- Chronic cases undergoing hemodialysis for at least 2 months for 3times / week regularly.
- Have not received any educational intervention regarding his/ her illness and its care.

#### **Exclusion criteria:**

- Patients who are critically ill and unable to communicate

#### **Sampling technique:**

- The participants of the study were chosen from hemodialysis unit in Menoufia University and Shebin El-Kom teaching hospitals. The sample

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size was determined based on the following equation:

$$n = (z^2 \times p \times q) / D^2$$

Z= the value from the standard normal distribution reflecting the confidence level that will be used 1.96 for confidence 95%.

P = proportion.

q = 1- proportion.

D2 = margin of error.

### **Instruments of the study:**

Based on the review of related literatures instruments used by the researcher for data collection, were as the following:

#### **Instrument I: Patients knowledge structured interview schedule:**

Based on the review of relevant literature (Wang et., 2018), two instruments were used by the researcher for data collection, these instruments were:

- **Instrument I:** Structured interview questionnaire.
- **Instrument 2:** Compliance assessment data sheet.

#### **Instrument I: Structured interview questionnaire:**

It was developed by the researcher to assess sociodemographic data, and patient's knowledge regarding hemodialysis and therapeutic regimen. It comprised of three parts as the following:

- **Part one:** social characteristics: It contained nine questions includes data related to patient's age, gender, education, occupation, marital status, monthly income, family member's number, and residence.
- **Part two:** Medical data: It contained seven questions about intake of stimulant drinks, smoking, duration of dialysis treatment, duration of dialysis sessions, complain during hemodialysis

sessions, complain of other diseases, and family history of chronic renal failure.

- **Part three:** Patient's knowledge: It contained 22 questions of three sections about the following:

#### **1. Section one: Patient's knowledge about renal failure:**

It was contained 4 questions related to patient's knowledge about definition, causes, clinical manifestations, methods of treatment of renal failure.

#### **2. Section two: Patient's knowledge about hemodialysis:**

It was contained 5 questions related to patient's knowledge about definition, indications, contraindications, complications of hemodialysis and care of hemodialysis vascular access.

#### **3. Section three: Patient's knowledge about hemodialysis therapeutic regimen:**

It contained 13 questions related to patient's knowledge about medications for hemodialysis, medications at the end of hemodialysis sessions, diet for hemodialysis, diet rich in protein, potassium and sodium, allowed amount of fluid, forbidden drinks for hemodialysis, complications of drinking a lot of fluid, periodic investigations for hemodialysis, definition of compliance to therapeutic regimen, and complications of non-compliance to therapeutic regimen.

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### **Scoring system:**

Each question was given two marks if the subject reported completely correct answer, one mark if he /she reported incompletely correct answer and zero if the answer was incorrect or I don't know. All questions were summed to give a score ranged from zero to forty-four. The greater the score the better the knowledge.

### **Instrument II: Compliance assessment data sheet:**

It was developed by the researcher after reviewing of relevant literature, to measure compliance of hemodialysis patient to attendance of hemodialysis sessions, medication, fluid, and dietary restrictions. It was comprised of two parts as the following:

- **Part one: compliance assessment:** It contained seven questions includes questions about compliance to dietary restriction, fluid restriction, weight measurement, medication, attendance to hemodialysis sessions, duration of hemodialysis sessions, and care of vascular access.
- **Part two: causes of non-compliance to therapeutic regimen:** It contained five questions about causes of non-compliance to diet, fluid restriction, medication, attendance to hemodialysis sessions, and duration of hemodialysis sessions.

### **Scoring system:**

Each item was given two marks if the subject complies, one mark if he /she partially comply and zero if he /she doesn't comply at all. All items were summed to give a score ranged from zero to fourteen. The score was categorized as:

- A score less than 50% denoted low compliance (from zero to 6 marks).

- A score from 50 % to less than 70% denoted moderate compliance (from 7 to 10 marks).
- A score of 70% or more denoted good compliance (from 11 to 14 marks).

### **Pilot study:**

A pilot study was conducted prior to data collection on 10% of the study sample (ten patients) to test the feasibility, clarity and applicability of the instruments then necessary modifications were done. These patients were excluded from the study sample.

### **Ethical Considerations:**

An agreement from Faculty of Nursing Ethical commitment was obtained. A verbal and written consent to participate in this study was obtained from subjects who met the inclusion criteria after explanation of the purpose of study. Each subject was reassured that any obtained information would be confidential and would only be used for the study purpose. The researcher emphasized that participation in the study was entirely voluntary and anonymity of the patients were assured through coding data. Subjects were also informed that they can withdraw from the study at any time without penalty and refusal to participate wouldn't affect their care. Moreover, they were assured that the nature of the questionnaire didn't cause any physical or emotional harm to them.

### **Procedure:**

An official letter was submitted from the Dean of the Faculty of Nursing to the directors of Menoufia University hospital and Shebin El Kom Teaching hospital explaining the purpose of the study and methods of data collection. Then, a written approval to conduct the study was obtained.

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Data collection extended over a period of 8 months from November 2020 to June 2021. Patients who agreed to participate in the study and fulfilled the inclusion criteria were assigned randomly into two equal groups (study group (I) and control group (II)).

Each patient was individually assessed for social characteristics, medical data and knowledge about renal failure, hemodialysis, and therapeutic regimen (using instrument one). Patient's compliance and causes of non-compliance were assessed using instrument II. The researcher started to assess the control group at first. The assessment phase lasted between 20-30 minutes

Accordingly, a colored booklet supported with illustrative pictures was prepared. It included information about renal failure (Definition, types, causes, clinical manifestations, and treatment), hemodialysis (definition, indications and complications), vascular access (definition, types, and care of vascular access), therapeutic regimen (dietary restrictions, fluid restriction, medication adherence, importance of adherence to therapeutic regimen, and complication of non-adherence).

In the study group, patients received health education as well as routine hospital care. The researcher distributed the prepared booklet between each patient in group 1 (study group) before starting session I. In each session lectures and discussions were used. Each teaching session was started by a brief summary about information provided at prior sessions. At the end of each teaching session a follow-up session was conducted to emphasize on the received information through asking questions and answering any question.

First session included information about renal failure definition, types, causes, clinical manifestations, stages and treatment were illustrated. At the

end of this session the researcher allowed patients to ask questions and provided them with the answers. During the second session, the researcher provided education about hemodialysis definition, indications, contraindications and complications. Also, patients received information regarding periodical investigations for hemodialysis patients

In the third session, the researcher provided education about vascular access (definition, types, complications, and care of hemodialysis vascular access and medications commonly prescribed for hemodialysis patients. The fourth session included dietary restriction of sodium, potassium, phosphorus and fat and allowed amount of fluids per day importance of adherence to therapeutic regimen and complications of non-adherence).

Posttest was carried out 1 month after the last teaching session. and 3 months after intervention in order to determine the effectiveness of nursing intervention using instrument I part three and instrument II part I.

### **Statistical analysis**

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups was done using Chi-square test ( $\chi^2$ ). For comparison between means of two groups of parametric data of independent samples, student t-test was used. For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-Whitney test was used. For

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comparison between means of two related groups (pre and post program intervention data) of parametric data, paired t-test was used. For comparison between more than two means of non-parametric data, Kruskal-Wallis ( $\chi^2$ ) was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r).

### **Results:**

**Table 1:** This table shows that, the greatest percentage of both study and control groups (34.0 % and 44.0% respectively) were in age group 60 years or more with mean age  $52.32 \pm 10.92$  years for study group and mean age  $52.64 \pm 9.25$  years for control group. About half of study group (50.0%) and more than half of control group (54.0%) were males. Regarding level of education, more than half of study group (52.0 %) and about two thirds of control group (64.0%) were illiterate. About half of study group (50.0%) and less than half of control group (46.0%) were house wives. Concerning marital status, the majority of both groups (92.0% and 94.0% respectively) were married. Regarding income the majority of both groups (82.0% and 88.0% respectively) had insufficient income. As regard residence, the majority of both groups (94.0% and 90.0% respectively) were from rural areas. In relation to family members number, less than half of study group (46.0%) and more than half of control group (56.0%) had five family members or more.

There were no statistically significant differences between both groups regarding all sociodemographic characteristics.

**Table 2:** This table illustrates that the majority of both study and control groups (84% and 94% respectively) consumed stimulants either tea or coffee. As regard smoking, the majority of both study and control

groups (96% and 90% respectively) didn't smoke. In relation to starting of dialysis, the majority of study and control groups (86% and 96% respectively) carried out dialysis for three years or more. Regarding complaints during dialysis sessions, the majority of study and control groups (74% and 80% respectively) had complaints during dialysis sessions and the most common complaints were muscle cramps and hypotension. Concerning complaints of other diseases, more than two thirds of study group (72%) and more than three quarters of control group (86%) complained of other diseases and more than two thirds of both groups (77.8% and 65.1% respectively) complained of hypertension. Regarding family history of renal failure, the majority of both groups (90% and 94% respectively) didn't have family history for the disease. There were no statistically significant differences between study and control groups regarding almost all medical data except for number of stimulant and cigarette intake.

**Table 3:** This table shows that pre intervention, there were non-significant differences between study and control groups regarding almost all mean subtotal knowledge scores. While post intervention either one month or three months there were highly significant difference among study group than control group regarding total and subtotal knowledge scores ( $P=0.000^*$ ).

**Figure (1):** This figure reveals that about two thirds of both groups (66.0%) had poor total knowledge score pre intervention that was decreased to 2.0 % three months post intervention among study group compared to 62.0% among control group.

There was significant difference among study group than control group one month and three months post

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intervention regarding total and subtotal knowledge level ( $P=0.000^*$ ).

**Table 4:** This table shows that preintervention, there was no statistically significant difference between study and control groups regarding total compliance score. While post intervention (one month and three months), there was highly statistically significant improvement among study group than control group regarding total compliance score to therapeutic regimen ( $p=0.000^*$ ).

**Figure (2):** This figure reveals that the minority of study group and control group (14%) comply to therapeutic regimen preintervention that was increased three months post intervention to (86%) among study group compared to control group that didn't change.

There was significant difference among study group than control group one month and three months post intervention regarding total compliance score ( $P=0.000^*$ ).

**Table 5:** This table reveals that nearly three quarters of study group (70%)

and about two thirds of control group (66%) didn't comply to diet because they didn't understand suitable diet. As regard causes of non-compliance to fluid restriction, about half of study group (50%) and less than two thirds of control group (64%) didn't comply to fluid restriction because they didn't have information about fluid restriction. Concerning causes of non-compliance to medication, the majority of both study and control groups (92% and 94% respectively) didn't comply to medication because of forgetfulness. Regarding causes of shortening hemodialysis sessions duration, more than three fourths of both study and control groups (82% and 88% respectively) didn't comply to duration of hemodialysis sessions because of having muscle cramps.

There were no statistically significant differences between both groups regarding all causes of non-compliance to treatment regimen.



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**Table (1): Distribution of both study and control groups according to their social characteristics**

Sociodemographic characteristics	Studied subjects (n= 100)				X <sup>2</sup>	p-value
	Study group (n=50)		Control group (n=50)			
	No	%	No	%		
<b>• Age</b>					9.195	.056
20 <30	4	8.0	1	2.0		
30 < 40	8	16.0	3	6.0		
40 <50	5	10.0	13	26.0		
50 <60	16	32.0	11	22.0		
60+	17	34.0	22	44.0		
<b>Min –Max</b>	23-75		23-62			
<b>Mean ±SD</b>	52.32±10.92		52.64±9.25			
<b>• Gender</b>					.160	.689
Male	25	50.0	27	54.0		
Female	25	50.0	23	46.0		
<b>• Level of education</b>					2.821	.420
Illiterate	26	52.0	32	64.0		
basic	2	4.0	3	6.0		
secondary	21	42.0	15	30.0		
high or post graduate	1	2.0	0	0.0%		
<b>• Occupation</b>					.208	.901
Worker	10	20.0	10	20.0		
house wife	25	50.0	23	46.0		
don't work or retired	15	30.0	17	34.0		
<b>• Marital status</b>					1.011	.603
Single	3	6.0	3	6.0		
Married	46	92.0	47	94.0		
Widow	1	2.0	0	0.0%		
<b>• Income</b>					.706	.401
Sufficient	9	18.0	6	12.0		
Insufficient	41	82.0	44	88.0		
<b>• Residence</b>					.543	.461
Rural	47	94.0	45	90.0		
Urban	3	6.0	5	10.0		
<b>• Family members number</b>					1.001	0.606
less than 3 members	5	10.0	4	8.0		
from 3 to 5 members	22	44.0	18	36.0		
five members or more	23	46.0	28	56.0		

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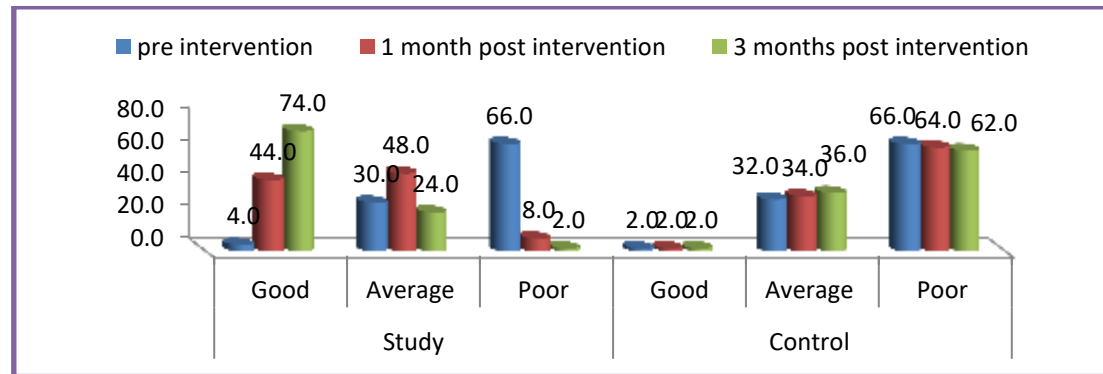
**Table (2): Distribution of both study and control groups regarding their medical data**

Medical data	Studied subjects (n=100)				X <sup>2</sup>	p-value
	Study (n=50)		Control (n=50)			
	No	%	No	%		
<b>Stimulant intake (coffee or tea)</b>					2.554	.110
Yes	42	84.0	47	94.0		
No	8	16.0	3	6.0		
<b>Number of stimulant intake</b>	N=42		N=47		7.10	0.029*
one time	5	11.9	2	4.3		
two times	17	40.5	32	68.1		
three times or more	20	47.6	13	27.7		
<b>Smoking</b>					1.382	.240
Yes	2	4.0	5	10.0		
No	48	96.0	45	90.0		
<b>Number of cigarettes</b>	N=2		N=5		7.00	0.008*
less than one packet	2	100.0	5	100.0		
<b>Starting of dialysis</b>					4.075	.254
from 6 months to 1 year	1	2.0	1	2.0		
from 1 to 2 years	4	8.0	1	2.0		
from 2 to 5 years	2	4.0	0	0.0		
from 3 years or more	43	86.0	48	96.0		
<b>Complain during dialysis session</b>					0.508	0.476
Yes	37	74.0	40	80.0		
No	13	26.0	10	20.0		
<b>**Type of complain during dialysis session</b>	N=37		N=40		40.18	.000
Headache	0	0.0	1	2.5		
nausea or vomiting	5	13.5	0	0.0		
Hypotension	21	56.8	4	10.0		
muscle cramps	20	54.1	12	30.0		
muscle cramps and hypotension	5	13.5	33	82.5		
<b>Complain of other diseases</b>					2.954	.086
Yes	36	72.0	43	86.0		
No	14	28.0	7	14.0		
<b>**Type of disease</b>	N=36		N=43		8.455	.076
Hypertension	28	77.8	28	65.1		
Diabetes	12	33.3	13	30.2		
heart disease	2	5.6	2	4.7		
hypertension and diabetes	3	8.3	16	37.2		
hypertension and heart disease	1	2.8	0	0.0		
<b>Family history</b>						
Yes	5	10.0	3	6.0		
No	45	90.0	47	94.0		
<b>Relative relation</b>	N=5		N=3			
first degree	5	100.0	3	100.0		

**Table (3): Mean and standard deviation of total and subtotal knowledge scores of study and control groups preintervention, one month post intervention, and three months post intervention**

Knowledge sub items scores (Each item scored 0-2)		Pre intervention		T p-value	1 month post intervention		T p-value	3 months post intervention		T p-value
		Mean	±SD		Mean	±SD		Mean	±SD	
Knowledge about renal failure	Study	1.64	.802	0.99 .323	5.48	1.528	13.75 .000*	6.58	1.401	18.97 .000*
	Control	1.80	.808		2.14	.782		2.30	.762	
Knowledge about hemodialysis	Study	1.42	.970	1.98 .050	6.10	1.908	14.64 .000*	8.18	1.698	22.96 .000*
	Control	1.78	.840		1.78	.840		2.02	.844	
Knowledge about medications for hemodialysis	Study	1.02	.979	1.38 .169	2.86	.880	11.83 .000*	3.36	.827	14.77 .000*
	Control	.76	.893		.76	.893		.80	.903	
Knowledge about diet for hemodialysis	Study	3.82	2.219	0.50 .614	13.38	3.415	15.44 .000*	16.24	2.729	22.28 .000*
	Control	3.56	2.879		3.58	2.907		3.70	2.894	
Knowledge about compliance to treatment	Study	.14	.404	0.56 .577	2.20	.808	17.20 .000*	2.96	.902	20.16 .000*
	Control	.10	.303		.10	.303		.14	.404	
Total knowledge	Study	8.04	3.746	0.05 .957	30.02	7.149	18.90 .000*	37.32	6.195	27.12 .000*
	Control	8.00	3.714		8.36	3.810		8.96	4.035	

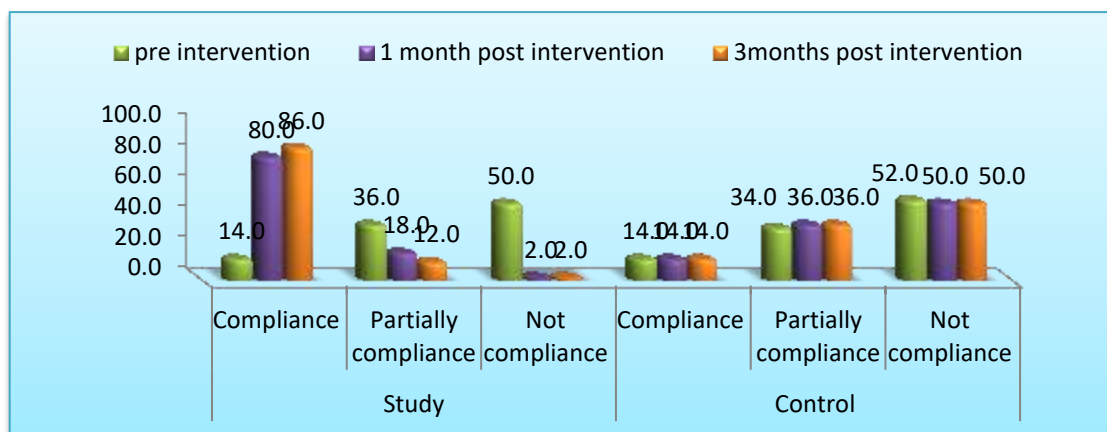
**Figure (1): Distribution of total knowledge level among studied hemodialysis patients (study and control groups) pre and post intervention**



**Table (4): Mean and standard deviation of total compliance score to therapeutic regimen of study and control groups pre intervention, one month post intervention, and three months post intervention**

Total compliance Score to therapeutic regimen		Pre intervention			1 month post intervention			3 months post intervention		
		Mean	±SD	T p-value	Mean	±SD	T p-value	Mean	±SD	T p-value
	<b>Study group (n=50)</b>	4.5400	.83812	2.40 0.018	10.6600	1.75674	23.49 .000**	13.1600	1.77695	31.63 .000**
	<b>Control group (n=50)</b>	4.1600	.73845		4.3800	.69664		4.5600	.73290	

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**Figure (2): Distribution of total compliance score among studied hemodialysis patients (study and control groups) pre and post intervention**

**Table (5): Distribution of study and control groups according to their causes of non-compliance to therapeutic regimen**

Causes of non-compliance	Study group (n=50)		Control group (n=50)		X <sup>2</sup> p-value
	No	%	No	%	
<b>Causes of non-compliance to diet</b>					
Don't have will for adherence to diet	1	2.0	0	0.0	1.349 .509
Can't avoid some food	14	28.0	17	34.0	
Don't understand suitable diet	35	70.0	33	66.0	
<b>Causes of non-compliance to fluid restriction</b>					
Isn't interested in fluid restriction	1	2.0	0	0.0	3.282 .194
Can't control amount of fluid	24	48.0	18	36.0	
Don't have information about fluid restriction	25	50.0	32	64.0	
<b>Causes of non-compliance to medication</b>					
Medication is expensive	3	6.0	3	6.0	1.011 .603
Forget	46	92.0	47	94.0	
Medication has side effects	1	2.0	0	0.0	
<b>Causes of shortening hemodialysis sessions duration</b>					
Having muscle cramp	41	82.0	44	88.0	.706
Hypotension	9	18.0	6	12.0	.401

## **Discussion:**

Hemodialysis is a major healthcare intervention for patients with renal failure and end-stage renal disease. An efficient hemodialysis treatment requires at least three sessions per week, with each session running for three to four hours and effective adherence to the diet, fluid, and following medical instructions. Adherence to the treatment regimen has proven to be difficult in patients undergoing Hemodialysis worldwide (Mukakarangwa et al., 2018).

The current study showed that there was highly significant difference in mean total knowledge score among study group than control group one month and three months post intervention than pre intervention. This finding is in agreement with Abdel-Gawad et al., (2020) who mentioned that the mean total knowledge score is highly improved in study group the 3rd and the last week post intervention than in control group. On the same line these results are in agreement with Mohammed et al., (2017) who studied "effect of exercises on fatigue and activities of daily living among patients undergoing hemodialysis" and reported that there was significant improvement between the study group than the control group related to total knowledge score after education.

Moreover, El Kareem & Fadlalmola (2020) studied "impact of an educational program on knowledge and quality of life among hemodialysis patients in Khartoum state" and reported that there was improvement in patient's knowledge from the pre to posttest after the implementation of the educational program about hemodialysis. Furthermore, Vulpio et al., (2021) revealed that the patients' nutritional knowledge significantly improved one year after they received

collective teaching and individual counseling.

Also, Alikari et al., (2018) who studied the impact of education on knowledge, adherence and quality of life among patients on hemodialysis stated that prior to the intervention, both groups had similar levels of knowledge. After the intervention, while there was a significant increase for both groups, the increase in the intervention group was significantly higher, resulting in a significantly higher score compared to the control group. From the researcher point of view, the low knowledge score before any intervention demonstrates the patient's need for education while increased knowledge level after education stresses the effect of this intervention.

### **Assessment of compliance:**

Treatment of nonadherence is a rampant problem among hemodialysis patients (Naalweh et al., 2017). Many studies reported that the highest patient adherence was to the HD treatment, followed by medication (Naalweh et al., 2017; Esterman, 2019 & Anuja & Ashok, 2020). The rate of nonadherence to diet and fluid restrictions, which has little direct impact on the treatment, ranges from 40% to 80% (Esterman, 2019).

The current study showed that the total compliance score was significantly improved among study group than control group after one month and three months post nursing intervention. These findings are in accordance with Wang et al., (2018) who stated that nursing intervention was associated with significantly increased compliance to dialysis and that the patients with nursing intervention had 15% higher dialysis compliance compared to patients given standard care only.

Also, Alikari et al., (2018) studied the impact of education on knowledge, adherence and quality of life among patients on hemodialysis and reported that there was a significant difference in both knowledge and adherence scores for intervention group. On the same line, D'Souza et al., (2018) stated that multidimensional educational interventions showed improvement among patients on hemodialysis, specifically for knowledge, therapeutic adherence and self-care management. As well as Duzalan & Pakyuz (2018) who mentioned that after the provision of education to the intervention group, the dietary knowledge and behavior significantly increased when compared to the pretest scores. Also, James et al., (2021) revealed that there was a significant improvement in adherence to dialysis, medication, diet and fluid after educational intervention and counseling.

On the same line, Arad et al., (2021) found that there was statistically significant difference in the mean score of overall treatment adherence between the two groups immediately 1 month and 3 months after the intervention in a research study titled "do the patient education program and nurse-led telephone follow-up improve treatment adherence in hemodialysis patients? A randomized controlled trial".

#### **Causes of noncompliance to therapeutic regimen:**

**Concerning causes of non-compliance to diet and fluid restriction:** The current study revealed that more than two thirds of both groups didn't comply to diet because of lack of understanding of suitable diet and more than half of study participants didn't comply to fluid restriction because of lack of knowledge about fluid restriction. These results are consistent with Lim et al., (2020) who reported that a greater proportion of hemodialysis

patients were found to exhibit limited nutrition literacy compared to limited health literacy and that nutrition literacy was a significant predictor of dietary adherence in hemodialysis patients.

On the same line these results are in agreement with Duan et al., (2022) who stated that poor quality of information probably has a negative effect on food literacy of patients leading to low dietary adherence. Also, Khamis et al., (2021) concluded that there was a prevalent low health literacy among the studied regular hemodialysis patients which was affected by education, age and income and in turn it affects the adherence to treatment. Moreover, James et al., (2021) stated that the major reason for poor adherence to the fluid and dietary restriction was patient's inability to control the willingness toward fluid intake and their unawareness about the seriousness of recommendations.

**Regarding causes of non-compliance to medication:** the present study showed that the majority of studied subjects didn't comply to medication because of forgetfulness. These results are consistent with Kefale et al., (2018) who concluded that forgetfulness was the most important reason preventing optimal adherence to prescribed medications. On the same line Ahlawat et al., (2016) studied "prevalence and predictors of medication non-adherence in patients of chronic kidney disease: Evidence from a cross sectional study" and stated that forgetting of medication was the most common motive for non-adherence, and maximum non adherence was for antihypertensive medications, indicates if patients do not have complication they tend to forget medication.

Also, James et al., (2021) stated that the major reasons for the poor adherence to the medications were forgetfulness, inconvenience,

medication cost, and misconception or lack of proper knowledge about importance of medications.

**In relation to causes of shortening hemodialysis session duration:** the result of the current study presented that the majority of studied subject shortened the duration of their hemodialysis sessions because of having muscle cramp. This finding is in congruence with Damasiewicz & Polkinghorne, (2017) who stated that around 33% to 86% of patients receiving hemodialysis have experienced muscle cramps and that the muscle cramps happen during hemodialysis and can lead to termination of dialysis session before the planned time, causing a less effective treatment.

Also, Albadry et al., (2020) who examined the effect of interdialytic hemodialysis exercises on fatigue and leg cramps reported that the majority of the patients were experience muscle cramps during the last hours of hemodialysis.

**Finally,** according to current study educational nursing intervention has significant impact on improving knowledge and compliance among hemodialysis patients. Thus, all nurses in every medical setting should teach hemodialysis patients about therapeutic regimen and consider this as a routine nursing intervention.

**Conclusion:**

Patients in the study group who received the designed educational nursing intervention had higher knowledge score than patients who didn't (control group). And patients in the study group who received the designed educational nursing intervention had higher compliance score than patients who didn't (control group).

**Recommendation:**

Monthly compliance progress report should be performed in the hospital by the dialysis nurse to discuss their patient's non-adherence behaviors. Supervised health teaching programs regarding therapeutic regimen should be provided for hemodialysis patients to improve their compliance behavior.

**References:**

Abdel-Gawad, D., Fareed, M., Abd El Bary, N., & Attalla H. (2020). Effect of nursing intervention on quality of life among patients receiving head and neck radiation therapy. Published Doctorate Thesis. Faculty of Nursing. Menoufia University; 74-83.

Ahlawat, R., Tiwari, P., & D'Cruz, S. (2016). Prevalence and predictors of medication non-adherence in patients of chronic kidney disease: Evidence from a cross sectional study. *J Pharma Care Health Sys.*;3 (1): 2376-9.

Albadry, A., Azer, S., Abd Elhamed, N., & Mostafa, N. (2020). Effect of interdialytic hemodialysis exercises on fatigue and leg cramps. *Assuit Scientific Nursing Journal.*; 8(2): 132-41.

Alikari, V., Tsironi, M., Matziou, V., Tzavella, F., Stathoulis, J., Babatsikou, F., Fradelos, E., & Zyga, S. (2018). The impact of education on knowledge, adherence and quality of life among patients on hemodialysis. *Quality of Life Research.*;28(5): 145-60.

Anuja, M., & Ashok, M.V. (2020). Compliance to fluid and dietary restriction and treatment adherence among chronic hemodialysis patients in a tertiary care hospital, Puducherry. *Int J Health Allied Sci.*; 9(1): 34.

Arad, M., Goli, R., Parizad, N., Vahabzadeh, D., & Baghaei, R. (2021). Do the patient education



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- program and nurse-led telephone follow-up improved treatment adherence in hemodialysis patients? A randomized controlled trial. *BMC Nephrology*.; 22(1): 119.
- Caplin, B., Kumar, S., & Davenport, A. (2017). Patients' perspective of haemodialysis-associated symptoms. *Nephrol Dial Transplant*.; 26(8):2656- 63.
- Carney, E.F. (2020). The impact of chronic kidney disease on global health. *Nat Rev Nephrol*.; 16(5): 251.
- D' Souza, B., Prabhu, B., Unnikrishnan, B., & Kamath, R. (2018). Effect of multidimensional educational interventions among dialysis patients. *The Open Urology and Nephrology Journal*.; 11(1): 72-8.
- Damasiewicz, M., & Polkinghorne, K. (2017). Intra-dialytic hypotension and blood volume and blood temperature monitoring. *Nephrology (Carlton)*.; 16(1):13-8.
- Duan, D., Liu, M., Chen, Y., Huang, Y., & Shi, Y. (2022). Food literacy and its associated factors in non-dialysis patients with chronic kidney disease in China: A cross-sectional study. *Patient Preference and Adherence*.; 16(1): 439-47.
- Duzalan, O. B., & Pakyuz, S. C. (2018). Educational interventions for improved diet and fluid management in hemodialysis patients: An interventional study. *The Journal of Pakistan Medical Association*.; 68(4), 532-7.
- El Kareem, E., & Fadlalmola, H. (2020). Impact of an educational program on knowledge and quality of life among hemodialysis patients in Khartoum state. *International Journal of Africa Nursing Science*.; 12(1): 205-9.
- Esterman, A. (2019). The effect of health literacy on treatment adherence in maintenance haemodialysis patients: A cross-sectional study. *Ren Soc Australas J*.; 15(1): 11–8.
- Fraser, S.D., & Blakeman, T. (2016). Chronic kidney disease: Identification and management in primary care. *Pragmat Obs Res*.; 7(1):21–32.
- Gaitonde, D.Y., Cook, D.L., & Rivera, I.M. (2017). Chronic kidney disease: Detection and evaluation. *Am Fam Physician*.; 96(1): 776 - 83.
- Gray, K.S., Cohen, D.E., & Brunelli, S.M. (2017). In-center hemodialysis absenteeism: prevalence and association with outcomes. *Clinico Economics and outcomes research: CEOR*.; 9(1):307.
- Ibrahim, S., Hossam, M., & Belal, D. (2015). Study of non-compliance among chronic hemodialysis patients and its impact on patients' outcomes. *Saudi J Kidney Dis Transpl*.; 26(1):243-9.
- Jager, K.J., Kovesdy, C., Langham, R., Rosenberg, M., Jha, V., & Zoccali, C. (2019). A single number for advocacy and communication—worldwide more than 850 million individuals have kidney diseases. *Nephrol Dial Transplant*.; 34(11):1803–5.
- James, M., Roy, A., Antony, E., & George, S. (2021). Impact of patient counseling on treatment adherence behavior and quality of life in maintenance hemodialysis patients. *Saudi Journal of Kidney Disease and Transplantation*.; 32(5): 1382-7.
- Kefale, B., Tadesse, Y., Alebachew, M., & Engidawork, E. (2018). Management practice, and adherence and its contributing factors among patients with chronic kidney disease at Tikur Anbessa Specialized Hospital: A

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- hospital-based cross-sectional study. *PLoS ONE* 13(7): 415.
- Khamis, S., Emara, M., Elnashar, M., Khalil, M. and Kasemy, Z. (2021). Development of health literacy for regular hemodialysis patients in Menoufia Governorate: A cross-sectional study. *Open Journal of Nephrology.*; 11(2): 199-216.
- Ko, G.J., Obi, Y., Tortoricci, A.R., & Kalantar-Zadeh, K. (2017). Dietary protein intake and chronic kidney disease. *Current opinion in clinical nutrition and metabolic care.*;20(1):77.
- Lim, J., Chinna, K., Khosla, P., Karupaiah, T., & Daud, Z. (2020). Understanding how nutrition literacy links to dietary adherence in patients undergoing maintenance hemodialysis: A theoretical exploration using partial least squares structural equation modeling. *Int J Environ Res Public Health.*; 17(20): 7479.
- Milazi, M., Bonner, A., & Douglas, C. (2017). Effectiveness of educational or behavioral interventions on adherence to phosphate control in adults receiving hemodialysis: a systematic review. *JBIM Database System Rev Implement Rep.*; 15(4):971–1010.
- Mohammed, H., Fareed, M., & Fatalbab, G. (2017). Effect of exercises on fatigue and activities of daily living among patients undergoing hemodialysis. Published Master Thesis. Faculty of Nursing, Menoufia University; 59-108.
- Mukakarangwa, M.C., Chironda, G., Bhengu, B., & Katende, G. (2018). Adherence to hemodialysis and associated factors among end stage renal disease patients at selected nephrology units in Rwanda: A descriptive cross-sectional study. *Nurs Res Pract.*; (5): 1–8.
- Naalweh, K., Barakat, M., Sweileh, M., Al-Jabi, S., Sweileh, W., & Zyoud, S. (2017). Treatment adherence and perception in patients on maintenance hemodialysis: a cross-sectional study in Palestine. *BMC Nephrol.*; 18(1):178.
- Ok, E., & Kutlu, F.Y. (2019). Hopelessness, Anxiety, Depression and Treatment Adherence in Chronic Hemodialysis Patients. *International Journal of Caring Sciences.*;12(1):423-9.
- Suganthi, S., Porkodi, A., & Geetha, P. (2019). Assess the illness perception and treatment adherence among patient with end stage renal disease. *Iran J Nurs Midwifery Res.*; 25(1): 12–7.
- Vulpio, C., Bossola, M., Di stasio, E., Carlomagno, G., Basso, L., Castorina, M., Miggiano, G., Brys, A. (2021). The effect of dietician education program on nutritional knowledge, dietary intake and phosphate control in patients with renal failure. *International Journal of Nutrition Sciences.*; 6(1), 22-31.
- Wang, J., Yue, P., Huang, J., Ling, Y., Jia, L., Xiong, Y., & Sun F. (2017). Nursing intervention on the compliance of hemodialysis patients with end-stage renal disease: A meta-analysis. *Blood Purif.*;45(3):102-9.
- Wang, J., Yue, P., Huang, J., Xie, X., Ling, Y., Jia, L., Xiong, Y. & Sun, F. (2018). Nursing intervention on the compliance of hemodialysis patients with end-stage renal disease: A meta-analysis. *Blood Purif.*; 45 (1):102-9.