

Fluid adherence and Self-Efficacy in Patients Undergoing Hemodialysis: The Effect Nursing Instruction

Marwa Mohammad Abd el baky⁽¹⁾, Lobna M. Gamal⁽²⁾, Eman Mammdouh Aziz⁽³⁾,
Eman Hussein Khalil⁽⁴⁾, Asmaa Ali Ahmed⁽⁵⁾

1) Assistant Professor of Medical Surgical Nursing Department (Critical Care Nursing), Faculty of Nursing - Minia University.

2) Professor of Medical Surgical Nursing Department (Critical Care Nursing), Faculty of Nursing – Minia University.

3) Lecturer of Critical Care Nursing, Faculty of Nursing – Assiut University.

4) Lecturer of Internal medicine/Endocrinology department

5) Lecturer of Medical Surgical Nursing Department (Critical Care Nursing), Faculty of Nursing - Minia University.

*Email of the corresponding author: marwa.radwan1@mu.edu.eg

Abstract

Background: Following the recommended fluid regimens is essential to the effectiveness of dialysis since it affects the patient's outcomes and sense of self-efficacy. **Aim of the study:** Evaluates the fluid adherence and self-efficacy in patients undergoing hemodialysis after receiving the nursing instructions. **Research design:** To achieve the aim, a Quazi-experimental research design was used.. **Setting:** This study was conducted at the Hemodialysis Unit, during the dialysis session, at Nephrology and Urology Hospital at Minia University, Minia City, Egypt. **Subjects:** A purposive sample is constituted (90) patients participated in the study. **Tools:** For this study, three tools were created and utilized to gather data., **First Tool:** Interview Questionnaire Sheet includes two parts **1st Part:** Personal data. **2nd Part:** Medical Data of the patient. **Second Tool:** Fluid Adherence assessment sheet, which include three parts: **1st part:** Fluid Adherence questionnaire, **2nd Part:** Pitting Edema Scale. **Third tool:** Self-efficacy questionnaire. **Results:** After one and two months, the patient's response to fluid adherence improved in a highly statistically significant manner. Patients self efficacy was statisticay imprved after the one month and two months of fluid adherence and shows positive correlation. **Recommendations:** The hospital should pay more attention to and closely monitor patient compliance with therapeutic hydration restriction, and a large sample size should be used for study replication. **Conclusion:** The current study documented the improvement in fluid adherence among the studied hemodialysis patients after implementing the nursing intervention which approves our study hypothesis.

Keywords: Adherence, Fluid, Hemodialysis Patients, Nursing Instructions, Self-Efficacy

Introduction

Chronic kidney disease (CKD) represents a significant global health challenge stemming from the gradual and irreversible decline in kidney function (Ummah et al., 2024). The fifth stage of chronic kidney disease (CKD), sometimes referred to as end-stage renal disease (ESRD), is marked by anatomical and functional abnormalities in the kidneys, most notably the loss of glomerular filtration capacity. This causes dangerous waste products to build up in the bloodstream, which can have toxic consequences on the body and lead to a variety of metabolic and systemic issues. (Goma, et al., 2021).

It is estimated that kidney disease affects over 850 million people globally, with CKD making up about 843.6 million of these cases. CKD was the 12th biggest cause of mortality

worldwide and was responsible for 1.2 million deaths. Hemodialysis and other forms of continuous renal replacement treatment (RRT) are crucial for managing end-stage renal disease (ESRD) and maintaining patient health. (Abdel Monem et al., 2022).

One therapeutic method used for renal failure is hemodialysis. It uses a semi-permeable membrane that functions similarly to nephrons, removing waste products from metabolism and bringing fluid and electrolyte balance back to those suffering from renal failure (Mailani & Bakri, 2020). Hemodialysis is administered sporadically three times a week for three to five hours each time in order to eliminate waste from the body's metabolism and control the amount of fluid in the body. Fluid removal performed during hemodialysis sessions in order to lessen interdialytic fluid excess (Stuard, et al., 202).

Edema, which raises blood pressure and puts more strain on the heart, can result from poor fluid adherence. Also, breathing difficulties might be brought on by an excess of fluid. Additionally, hemodialysis patients who disregard these fluid limitations run a much higher risk of being admitted to the hospital and dying (Mailani, et al., 2023).

Fluid management is required to improve quality of life, encourage compliance to fluid restriction, and lessen issues. According to the World Health Organization (WHO), adherence is the degree to which a person follows a healthcare provider's advice as when taking their drugs. (Abdel Monem, et al., 2022).

Individuals who experience excessive interdialysis weight gain (IDWG) as a result of inadequate fluid adherence are more likely to experience severe symptoms and consequences, such as acute cardiac damage, and to die. One of the most prevalent problems that hemodialysis patients have is non-adherence to recommended fluid consumption restrictions. (Hermis, & Abed, 2021).

Self-efficacy as a result of patients adhering to therapeutic interventions, improves patients own disease management. The belief in one's own ability to achieve one's own objectives and reach the intended aims is known as self-efficacy. Self-efficacy was defined in the previous decade as people's confidence in their own skills to execute as intended, which has a good impact on health experiences and maintains life's vigor. (Mohammed, et al., 2020). Furthermore, self-efficacy indicated how an individual's views and intellectual convictions influence their actions. Higher levels of cooperation, self-care, communication, and medication-adherence behavior have all been found to be significantly correlated with higher perceived self-efficacy ratings and quality of life (QoL). (Mailani, et al., 2023).

The mental and physical health of patients with end-stage renal illness has been demonstrated to benefit from a variety of behavioral, educational, cognitive, and nutritional nursing interventions. When assessing a patient's degree of adherence, nurses should respect their choices and views without making judgments. modifying treatment to meet the needs of each patient, asking about preferences, streamlining

dosage schedules, and using adherence aids. In order to encourage adherence behavior, it is imperative to apply evidence-based therapeutic nursing interventions that are accessible and reasonably priced. (Abdel Monem et al., 2022).

Significance of the study

Hemodialysis (HD) is an effective treatment for chronic kidney disease (CKD), a serious global public health concern. According to the Egyptian Ministry of Health register, there are around 56,000 hemodialysis patients nationwide. (Megahed et al., 2019).

The number of hemodialysis patients at Minia University's Nephrology and Urology Hospital in 2023 (175 patients) and 2020 (164 patients). In America, hemodialysis patients do not adhere to fluids in the range of 7.9% to 8.5%, whereas in Europe and Japan, this range rises from 9.7% to 49.5%. (Putri, et al 2019).

Hemodialysis patients don't know enough about the required fluid intake, according to the researcher observation. The current study was conducted to improve CKD patients' adherence to fluid intake for patients undergoing hemodialysis. Patients believe that it is acceptable to consume large volumes of fluid while receiving dialysis because the hemodialysis machine filters their blood.

Aim of the study

Evaluates the fluid adherence and self-efficacy in patients undergoing hemodialysis after receiving the nursing instructions

Research hypotheses

- Adherence to fluid restriction among patients undergoing hemodialysis will be improved after receiving the nursing instruction.
- Self-efficacy among patients undergoing hemodialysis will be improved after receiving the nursing instruction.

Subjects and Methods

Design of the Research:

To achieve the research aim, a Quazi-experimental research design (pretest and post-test) was used.

Setting:

This research was conducted at the Hemodialysis Unit during the hemodialysis session at the Nephrology and Urology Hospital at Minia University, Minia City, Egypt.

Duration of the Study:

The data was collected over a six-month period. (started at the first of May 2024 and ended in October 2024).

Subjects:

Ninety patients who agreed to take part in the study were involved in the purposive sample using the sample size formula:

Sample Size

N= required sample size.

T= confidence level at 95% (standard value of 1.960).

P= estimated prevalence of fluid and dietary adherence among patient undergoing hemodialysis at Minia University Nephrology and Urology Hospital 2023 (0.06).

m = margin of error at 5 % (standard value of 0.050).

$$N = \frac{t^2 \times p(1-p)}{m^2}$$

$$N = \frac{(1.96)^2 \times 0.06(1-0.06)}{0.05^2} = 90$$

Inclusion Criteria:

Those with end-stage renal disease (ESRD) aged 18 to less than 65 who were receiving hemodialysis and had regularly completed maintenance hemodialysis for at least three months to less than five years.

Exclusion Criteria the Patients will be excluded if:

Patients with acute renal failure and Patients undergoing peritoneal dialysis

Tools for Collecting Data

Following a comprehensive and relevant review of the literature, the researcher developed three tool for the study.

First Tool: "Interview Questionnaire" to assess personal and medical data of the patient, modified from (Beerappa et al., 2019). It has been filled out by the researcher and consists of two parts:

First Part: Personal Data: age- gender - level of education- occupation- income- marital status and residency.

Second Part: Medical Data: intera-dialysis weight gain (good adherence: IDWG < 1 kg/day – fair adherence: IDWG 1 -2 kg/day-poor adherence: IDWG > 2 kg/day).

Second Tool: Fluid Adherence assessment

Comprised of three parts modified from (Bishop et al., 2019; Kim et al., 2010)

First Part: Fluid Adherence questionnaire include four items covers the types and amount of fluid recommended per day

Each item was observed, categorized, and scored into either none of the time response = (1), once response = (2), twice response = (3) the correct answer is once

Second Part: Pitting Edema Scale, adopted from (Brodovicz et al., 2009). Used as indication about the patient therapeutic nutrition adherence. The items of the tool was observed, categorized, and scored into:

Used to assess how well a patient is adhering to their recommended diet. The tool's items were examined, grouped, and graded into:

0 + No pitting edema.

1 + Mild pitting edema 2 mm depression that disappears rapidly.

2 + Moderate pitting edema 4 mm depression that disappears in 10-15 seconds.

3 + Moderately severe pitting edema. 6 mm depression that may last more than 1 minute.

4 + Severe pitting edema. 8 mm depression that can last more than 2 minutes.

Third tool: Chronic kidney disease self-efficacy questionnaire adopted from (Almutary & Tayyib, 2021) which includes 25 questions. Each question had a possible score between 0 and 10 points, with 10 representing total confidence and 0 representing no confidence. On this scale, a total score could be ranged from 0 and 250 points.

Validity and Reliability:

Five medical-surgical nursing experts from Minia and Assuit University's Faculty of Nursing served on the jury committee that tested the study tools' content and construct validity. They ensured that the items were complete, clear, and had the necessary modifications made.

The Cronbach's Alpha test was used to quantify the research instruments' reliability in order to assess their internal consistency and determine how well they consistently measure the things they were intended to measure. It was **(0.93)** for the first tool, **(0.81)** for the second tool, and **(0.89)** for the third tool.

Pilot study

To test the viability, objectivity, and applicability of the study instruments and to estimate the time required to finish data collection, a pilot study was performed on 10% of the study patients who met the inclusion criteria at the hemodialysis unit of the Nephrology and Urology Hospital at Minia University. No modifications were done and the number of patients (9) were included in the study

Ethical Consideration

Official permission to conduct the study was obtained from the Faculty of Nursing Research Ethics Committee at Minia University in Egypt. Each participant received a thorough explanation of the study's purpose and importance. Participants who agreed to be part of the study gave their informed permission, agreement from the directors of the dialysis units at Minia Nephrology and Urology Hospital as well as from Egypt's academics for the research center and technology. Patients were told that no future research would use their data without their permission. All data was coded to ensure the privacy and anonymity of every participant.

Procedure

The current study was completed in three stages: assessment phase, implementation, and the evaluation phase

Assessment phase:

Following formal approval, the assessment phase and pre-test were collected for four weeks to test the studied patients' true degree

of understanding of therapeutic fluid adherence among hemodialysis patients.

Three days a week, during the morning and evening shifts, the researcher gathered the sample. The researcher met with patients for the first time during the assessment phase to introduce themselves and explain the nature and goal of the study. The researcher explained the assessment questionnaire and gave an overview after getting the patient's oral consent to take part in the current investigation. The researcher completed the questionnaire. Nine small groups were formed from the 90 total sample members, and each group received four sessions.

During the first patient interview of the assessment (pre-test) the researcher used the first tool (1st part and 2nd part), Second Tool (1st, 2nd, and 3rd part) and the third Tool.

B. Implementation phase:

Each patient group received the same number of fluid adherence education sessions from the researcher; these sessions lasted roughly thirty to forty-five minutes each. Each patient's appointment for an educational session is planned based on their clinical status.

First session: include details about the kidneys, its function, chronic renal failure definition & causes & signs and symptoms, complications, as well as laboratory testing to identify the illness and its management. **Second session:** the researcher clarified to the patient definition of dialysis, types of vascular access used, dangerous symptoms that necessitate hospitalization in case of hypervolemia & instructions to maintain the vascular access. **Third session:** the researcher discussed with the patient about types and sources of therapeutic fluid that that would be appropriate for hemodialysis as well as the patient's problems and how to resolve them. **Fourth session:** The patient was given the recommended fluid intake frequency and amount for hemodialysis, as well as thirst measures to control thirst.

A booklet that was created by the researcher and edited by five panels of medical surgical nursing staff and was given to the full study sample as a guide (in Arabic). It contained information on therapeutic fluid

adherence among hemodialysis patients. Patients were given the opportunity to talk, ask questions, and gain a thorough knowledge understanding.

Evaluation Phase

Every patient was evaluated three times.

1-First Time Evaluation (Pre test) was done before implementing nursing instruction by the first, second, and the third tool.

2-Second Time Evaluation (the first post-test) was done after one month of the nursing instruction and received a booklet about fluid adherence for hemodialysis patients. The researcher used the first tool (two part), the second tool (three part), and the third tool.

3-Third Time Evaluation (second post-test) was conducted after two months after receiving the booklet about fluid adherence for hemodialysis patients. The researcher used the previously listed tool parts mentioned in the first evaluation.

IV. Statistical design:

Statistical methods for data analysis

The Statistical Package of Social Science (SPSS) version (20) was used to arrange, tabulate, categorize, analyze, and enter the gathered data. The use of descriptive statistics, such as mean, standard deviation, frequency, and percentage, was implemented. Chi-square test used as a way to test the association between two categorical variables. Anova test was utilized to compare means over observations. The correlation coefficient between quantitative variables was calculated using Pearson's method. When $p < 0.05$, a significant level value was taken into account. Less than 0.001 was regarded as highly significant (**), and the lesser the p-value, the more significant the result (*).

Results

Table (1): Reveals that 44.4% of the studied patients were in the age group of 40–59 years. Moreover, regarding gender 51.1% of them were males. In addition, marital status

80% was married. In relation to education level, 32.2% of them read and write while 40 % of them were illiterate. In relation to occupation, 56.7 % were unemployed. Concerning residence, 68.9% of them came from rural areas.

Figure (1): Illustrates a reduction in the mean and standard deviation of interdialytic weight gain at the 1st and 2nd observations (post one month and post two months) compared with the pretest.

Figure (2) documented statistical significant improvement in the patients' level of therapeutic fluid adherence level from pre to post test. As 4.6% represents a good level of adherence at pretest observation which increased after one month of implementing the nursing instructions to 92.2% then become 75.5% after two months of implementing the nursing instructions

Table (2): clarified that 45.6% of the studied patients had not pitted edema at pretest observation compared to pretest 60 % of them who had not pitted edema at the 2nd observation post-nursing instructions, and 76.7% at the 3rd observation post-nursing instructions with statistically significant differences represented by a p value (0.001).

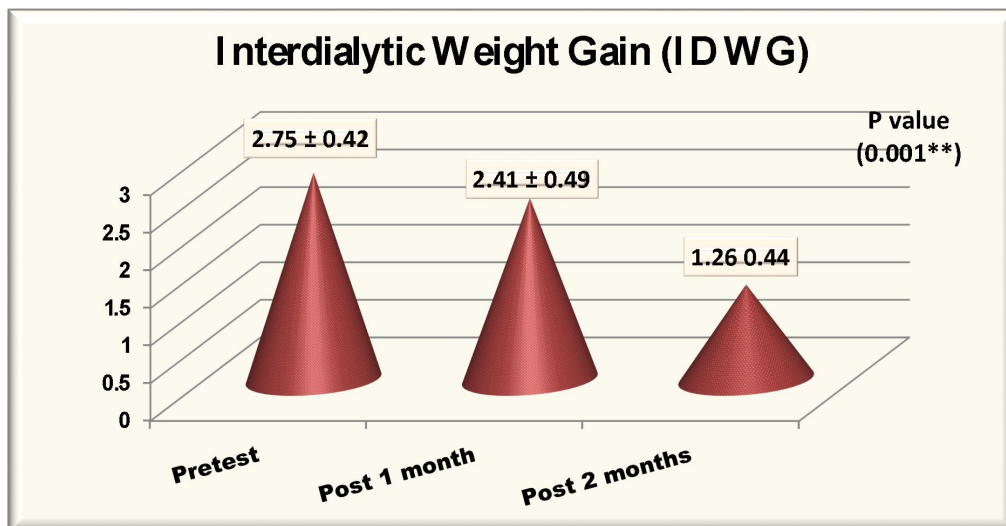
Table (3): Illustrates a significant improvement in the mean and standard deviation of total self-efficacy scale score. 188.4 ± 14.8 at pretest observation compared to 195.8 ± 16.2 post 2 months of implementing the nursing instructions represented by a p value (0.001).

Table (4): Shows significant positive correlation between fluid adherence and interdialytic weight gain among the studied patients after one and two months post-nursing instructions. Also it was noticed that there was a significant positive correlation between fluid adherence and pitting edema degree among them post-nursing instructions.

Table (5): Shows significant positive correlation between the application of nursing instructions and fluid adherence and self-efficacy level among the studied patients after two months of its application.

Table (1): Distribution of Studied Patient Regarding to Their Socio-demographic characteristics (n=90).

Socio-demographic Characteristics	Study (n=90)	
	No.	%
Age / Years		
18-39	28	31.1
40-59	40	44.4
60-64	22	24.4
Mean ± SD	42.2 ± 17.5	
Gender		
Male	46	51.1
Female	44	48.9
Marital Status		
Single	15	16.7
Married	72	80
Divorced	3	3.3
Level of Education		
Illiterate	36	40
Read and Write	29	32.2
Primary – Preparatory	5	5.6
University	20	22.2
Occupation		
Employee	9	10
Unemployed / Retired	51	56.7
House wife	25	27.8
Farmer	5	5.6
Residence		
Rural	62	68.9
Urban	28	31.1

**Figure (1):** Mean Score of Interdialytic Weight Gain Pre and Post Test (n=90)

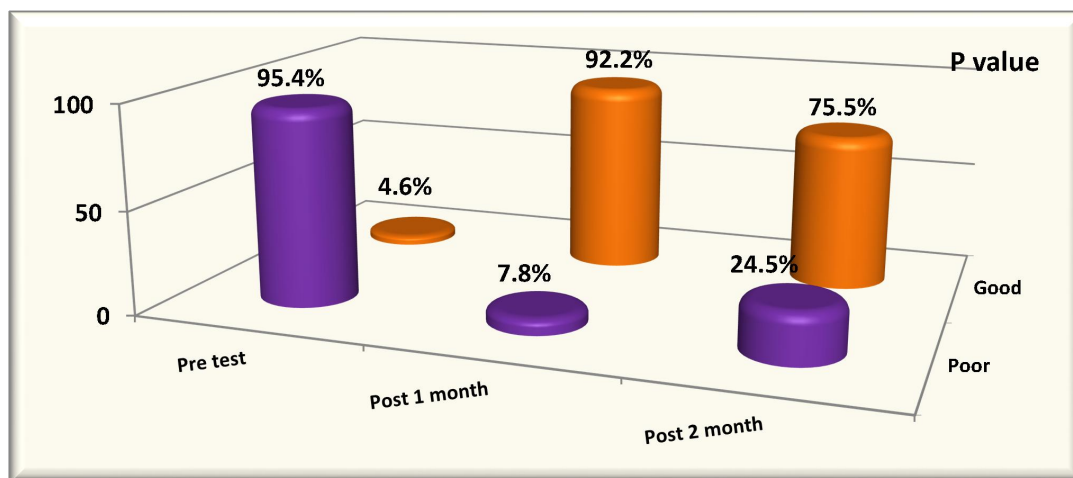


Figure (2): Distribution of Studied Patient Regarding to Their Therapeutic Fluid Adherence level Pre and Post Test (n=90)

Table (2): Frequency & Percentage Distribution of Studied Patient Regarding to Pitting Edema Degree Pre and Post Test (n=90)

Edema Degree	(first evaluation)		(after one month)		(after two months)		P-value ^a
	No	%	No	%	No	%	
	(n=90)		(n=90)		(n=90)		
- No pitting edema (0+)	41	45.6	54	60	69	76.7	0.001**
- Mild pitting edema (1+)	29	32.2	23	25.6	14	15.6	
- Moderate pitting edema (2+)	15	16.7	11	12.2	7	7.8	
- Moderately severe pitting edema (3+)	5	5.6	2	2.2	0	0	
- Severe pitting edema (4+)	0	0	0	0	0	0	

* Statistical Significant Difference ($P \leq 0.05$) ** Highly Statistical Significant Difference ($P \leq 0.01$)

Table (3): Mean Score of Studied Patient Regarding to Self Efficacy Scale Pre and Post Test (n=90)

CKD-SE subscale	(first evaluation)	(after one month)	(after two months)	P-value ^a
	Mean ± SD	Mean ± SD	Mean ± SD	
- Autonomy	58.4 ± 6.06	70.5 ± 7.39	62.8 ± 8.10	104.5 (0.001**)
- Self-Integration	51.7 ± 5.92	55.01 ± 5.38	52.7 ± 4.97	
- Problem solving	47.3 ± 5.50	49.04 ± 6.26	47.7 ± 4.97	
- Seeking Social Support	30.4 ± 4.13	33.4 ± 4.13	32.3 ± 5.50	
Total Score	188.4 ± 14.8	208.7 ± 14.3	195.8 ± 16.2	

* Statistical Significant Difference ($P \leq 0.05$) ** Highly Statistical Significant Difference ($P \leq 0.01$)

Table (4): Correlations between Fluid Adherence and Interdialytic Weight Gain (IDWG), and Pitting Edema among Studied Patient Post Test (n= 90).

	Fluid	
	<i>R</i>	<i>P</i>
IDWG	- 0.651	0.000**
Edema	- 0.646	0.049*

* Statistical Significant Difference ($P \leq 0.05$) ** Highly Statistical Significant Difference ($P \leq 0.01$)

Table (5): Correlations between Implementation of Nursing, Studied Patients' Fluid Adherence and Self-efficacy Post Test (n= 90).

	Instruction	
	<i>R</i>	<i>P</i>
Fluid adherence	0.740	0.001**
Self-efficacy	0.620	0.001**

* Statistical Significant Difference ($P \leq 0.05$) ** Highly Statistical Significant Difference ($P \leq 0.01$)

Discussion

Chronic kidney disease (CKD) is a public health problem worldwide, CKD affects up to 13% of the world's population, and its mortality rate is continuing to increase, especially in developing countries (**Perdana, et al., 2021**). More than two million individuals worldwide currently rely on dialysis or transplantation to survive, with hemodialysis being the most prevalent treatment for 98.7% of patients with end-stage renal disease (ESRD). (**Mahmoud, et al., 2024**).

One of the biggest issues that hemodialysis patients face is non-compliance with fluid intake limitations. Hemodialysis patients have poor adherence to fluid regulation, which considered a component of self-management. (**Hermis, et al., 2021**). Patients who take drugs that dry out the mucus in their membranes, such as diuretics, find it difficult to manage their fluid consumption because they become thirsty and want to drink.. It occurs because, under normal circumstances, people cannot survive without fluids for longer than food intake (**Kartini, et al., 2020**).

The results of the present study showed that over half of the patients were between the ages of 40 and 59. In terms of gender, the current study's findings showed that men represents the largest proportion of the patients. According to the researcher, this result may be because middle-aged members are more likely to have ESRD. Males were more likely to suffer from

renal disorders as a result of their work-related risks as farmers, interstitial nephritis from pesticide exposure, and dehydration.

These results were consistent with the study of (**Gartika et al., 2021**) who found that over half of the patients with ESRD were male and that they ranged in age from 40 to 60. Similarly, (**Antony, et al., 2020**) who shared the same sociodemographics as those in our research. Additionally, (**Emara et al., 2022**), demonstrated that over half of the patients were males.

According to the current study, the majority of patients were married, and the largest proportion of them were illiterate; this is similar to the study of (**Beerendrakumar et al., 2018**) who mentioned that the patients' attitudes toward the illness were influenced by the fact that the majority of them were married and the largest proportion were illiterate.

Over half of the patients in the present study were unemployed. From the perspective of the researcher, the current study clarified how ESRD frequently impacts the patient's quality of life and activities of daily living. The present findings were matched with (**Emara et al., 2022**), who documented that the highest percentage of the patients had no work.

Concerning the residence, it was observed that most of the patients were from rural areas; this is confirmed by (**Mohammed Mousa et al., 2020**), who found that the majority of studied patients were from rural areas.

The current findings demonstrate the beneficial impact of nursing advice in assisting hemodialysis patients in adhering to fluid restriction, as seen by the decrease in the mean and standard deviation of interdialytic weight gain at the first and second observations. **Beerappa, et al., (2019)** observed that the total mean interdialytic weight gain of the participants was 1.40 ± 0.37 kg/day which indicates overall moderate adherence to fluid restrictions among the participants.

The current outcome showed that patients' fluid adherence had significantly improved. According to the researcher, patient responses improved once nursing instructions regarding recommended fluids were put into practice because the patients in the study realized how important those instructions were for managing their conditions and overcame challenges with following therapeutic fluid instructions. Similarly **(Fadlalmola et al., 2020)** showed that from the pretest to the posttest, the patient's understanding of the therapeutic fluid requirements during hemodialysis treatment improved. Consistent with **(Fauzi et al., 2022)** finding that fluid self-care performance were higher after the hemodialysis education program than before participation among the studied subjects. **Dsouza, et al., (2023)** had the same findings that following the instructional intervention, the intervention group's adherence to fluid restriction significantly improved, whereas the control group's adherence decreased.

The degree of edema was found to decrease with increased adherence to nursing instructions and therapeutic fluid control. This outcome was similar to **(Kaplan et al., 2022)**, who documented that patients' adherence to treatment is positively impacted by regular education regarding fluid intake and disease management.

The current research had shown that. After one and two months following nursing instructions, a significant positive correlation between the patients' interdialytic weight gain and fluid adherence was established. A similar finding was established by **Raveinal et al., (2020)** who concluded that adherence to dietary salt and fluid intake limitations was one of the factors influencing the IDWG for hemodialysis

patients. These results were matched with **Muliani et al., (2021)** who reported that patients with renal disease may be at risk for peripheral edema and fluid retention if they do not follow a low-sodium diet.

The current study shows a significant improvement in the mean of the total self-efficacy scale score from the pretest observation compared to the significant increase seen after one month and after two months of putting the nursing instructions into practice with regard to fluid adherence and self-efficacy in CKD patients. Significant relation was found between patients' self-efficacy and the IDWG, as well as between patients' self-efficacy and fluid adherence. It illustrates the beneficial impact of fluid adherence on patients' health state in order to carry out a certain task, like limiting fluid intake to achieve the intended health results for patients receiving hemodialysis (HD).

Following nursing instructions, most of the patients adhere to fluid restriction. According to the researcher, the patient is aware of the dangers of fluid overload, which can result in increased fluid retention, necessitating emergency hemodialysis sessions and numerous complications. The current study finding, supported by **(Abed, 2022)** demonstrated that the patient's adherence to fluid requirements during hemodialysis treatment increased from pretest to posttest. **Halle, et al., (2020)** found that the majority of the participant adhere to fluid restriction and had good knowledge about fluid control. On the other hand **Roni, & Awaludin, (2023)** reported that IDWG can be avoided by controlling fluid intake, managing thirst, and increasing patient self-efficacy.

The present study was in line with the study done by **Masoud, et al., (2023)** strong positive correlation was found between fluid control education and self efficacy. Also **Mailani, et al., (2023)** were in line with the present study and reported a strong significant relationship with the direction of positive correlation between self-efficacy and adherence to fluid intake restrictions in CKD undergoing hemodialysis. Nurses in the dialysis unit provide vital role in controlling patients fluid

adherence which in turn increases patient's self efficacy.

Conclusion

The current study documented the improvement fluid adherence among the studied hemodialysis patients after implementing the nursing instruction which approve our study hypothesis. The higher the self-efficacy, the more compliant the patient with fluid intake.

Recommendations

The researcher proposed the following based on the results of the study:

1. Greater attention should be given to monitor patient adherence to therapeutic fluid .
2. Patients should get the necessary education regarding the significance of fluid adherence for hemodialysis patients and how it affects their sense of self-efficacy
3. In order to get more broadly applicable findings, the study should be replicated using a bigger probability sample drawn from various regions of Egypt..
4. Future research must be conducted to evaluate the reasons linked to low adherence to therapeutic fluid and its impact on self-efficacy

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