

Effect of Educational Intervention on Self- Care Behaviors of Hemodialysis Patients: Based on PRECEDE Model

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Abstract

Background: Patients on hemodialysis struggle greatly with self-care. Patients' ability to regulate and manage their symptoms is necessary for improved self-care. Education can help to improve one's behaviors regarding self-care. **Aim:** Evaluate the effect of educational intervention on self-care behaviors of hemodialysis patients based on PRECEDE Model. **Design:** A quasi-experimental design was utilized. **Setting:** The study was carried out in the Dialysis Unit at Benha University hospital, in Benha City. **Sampling:** Purposive sample included 120 hemodialysis patients. **Tools:** Two tools were used for data collection, **Tool I:** A structured interviewing questionnaire to assess socio-demographic characteristics and medical history of the studied patients. **Tool II:** Predisposing, Enabling, and Reinforcing Questionnaires (PRECEDE Model questionnaire). **Results:** There was a significant statistically differences between hemodialysis patients' total predisposing and their enabling and reinforcing factors pre and post intervention implementation ($P= 0.000$). **Conclusion:** Health educational intervention based on PRECEDE model is effective in raising the level of self-care behaviors of hemodialysis patients. **Recommendations:** Provide continuous and repeated educational program for hemodialysis patients to assure they have sufficient level of knowledge and self-care.

Key words: Educational Intervention, Self- Care Behaviors, Hemodialysis Patients, PRECEDE Model.

Introduction:

Different critical tasks were carried out by healthy, normal kidneys. The body's water and electrolyte balance, elimination of waste materials, and production of various hormones like thrombopoietin, erythropoietin, prostaglandins, renin, and others are all crucial functions of the kidneys. These hormones control the body's calcium levels and blood pressure. Renal illness prevents the kidneys from doing these typical tasks, which causes the body to retain water and salt (Mehmood et al., 2019).

Hemodialysis is an alternate kind of care for those with chronic renal failure and increases their chances of survival. Hemodialysis is a treatment that eliminates excess fluids and electrolytes while filtering waste. In hemodialysis, blood is drawn from the body and passed through an artificial kidney or dialyzer to be filtered before being returned to the body (Isarannar et al., 2017).

Appropriate vascular access is necessary for optimal hemodialysis. In comparison to a double lumen catheter, the Arteriovenous Fistula (AVF) offers sufficient blood flow for dialysis and has fewer problems. AVF access is long-term and requires less hemodialysis interventions. However, there are still several risks connected to using an AVF access site, including hand edema, infection, thrombosis, aneurysms, and cardiac overload. Adopting a daily AVF self-care routine can stop these issues from occurring (Rashid et al., 2018).

The strongest healthcare outcomes occur when individuals actively participate in their own care. The patient's active participation in the healing process by doing certain physical care activities is considered self-care (Pourbalouch et al., 2019). Patients who practice self-care can become better at taking care of themselves by making more informed choices and taking more personal responsibility for their health. Health concepts and self-care techniques must be communicated to patients

clearly, simple to use, and economical if they are to maintain healthy behaviors. Making decisions regarding a course of therapy and lifestyle modifications that may improve one's physical and emotional well-being will be easier with more knowledge (**Whdan et al., 2019**).

Patients who practice self-care had greatly enhanced clinical results, including greater quality of life, fewer hospitalizations, and longer lifespan in those with chronic diseases (**Riegel et al., 2021**). Self-care includes a range of general and disease-specific practices that people with a chronic illness participate in to preserve their physical and mental wellbeing. These actions are referred to be self-care maintenance, including maintaining adequate sleep, taking prescribed medications, managing stress, and engaging in physical activity (**Barbaranelli et al., 2019**).

The PRECEDE Model is a potent theoretical framework that directs the creation of practical nursing-led interventions and offers a useful conceptual framework for creating educational programs. This model is used to evaluate health issues and variables influencing people's health condition as well as to pinpoint areas in need of health education. This methodology places special emphasis on two aspects of evaluation and intervention (**Jeihooni et al., 2023**).

It's crucial to examine the variables that affect hemodialysis patients' self-care behaviors to enhance them. One of the models that is most suitable and appropriate for describing behavioral features is the PRECEDE model. Predisposing factors (individual and social traits that encourage healthy behaviors), reinforcers (physical and spiritual rewards that support healthy behaviors), and enablers (environmental traits that support the development of healthy behaviors or any skill in an individual) are all parts of this model (**Mosavi et al., 2020**).

Clinical practitioners, educators, coordinators, advisors, and researchers are all responsibilities played by community health nurses. They are crucial in helping CKD patients receive nursing care so they can live independently (**Afzal & Hardy, 2021**). To support CKD patients on hemodialysis to

achieve optimal hemodialysis adequacy, nurses play a crucial role as advocates, advisors, and instructors. To enhance the quality of life for hemodialysis patients, nurses must possess professional skills in patient preparation prior to hemodialysis, patient monitoring, and working with other healthcare professionals to determine sufficient achievement. (**Faridah et al., 2021**).

Significance of the study:

A chronic kidney disease is a medical condition that calls for expensive, ongoing treatment. Around the world, the prevalence of Chronic Renal Failure (CRF) is rising at an alarming rate. There is a rising frequency of this in many different nations. It is commonly known that more than 50 million people worldwide have CKD, and that over one million of them need renal replacement therapy including dialysis and renal transplantation (**Hayes et al., 2022**). In developed countries, there were 6 to 8 cases of CRF per 100,000 people per year. The prevalence of ESRD has significantly increased in emerging nations like Egypt. About 1.68% of hospitalized Egyptian patients have ESRD, indicating that Egypt is the country with the highest mortality rate for those with kidney failure, with 25% of patients dying annually, compared to a global death rate of only 10% for this condition (**Saleh et al., 2018**).

The prevalence of ESRD raised to 483 patients per million persons in Egypt, according to the 9th Annual Report of The Egyptian Renal Registry released by the Egyptian Society of Nephrology and Transplantation (ESNT). The average age is almost 49.8 19 years. Males made up 55.2% of the population while females made up around 44.8% (**El-Ballat et al., 2019**).

The aim of the present study:

This study aimed to evaluate the effect of educational intervention on self-care behaviors of hemodialysis patients based on PRECEDE model. This could be achieved through the specific objectives:

1. Assess patients' knowledge regarding hemodialysis and self-care behaviors pre and post educational intervention.

2. Assess patients' self-care behaviors pre and post educational intervention.

3. Assess patients' attitude regarding self-care pre and post educational intervention.

4. Designing, implementing, and evaluating the effect of PRECEDE model for patients to improve their self-care behaviors.

Research hypotheses:

Hypothesis 1: After using the PRECEDE model, patients' knowledge regarding hemodialysis and self-care behaviors will be better than before.

Hypothesis 2: After using the PRECEDE model, patients' attitudes about self-care will be better than before.

Hypothesis 3: Patients' behaviors regarding self-care will improve as a result of the PRECEDE model.

Subject and Methods:

Research design:

A quasi-experimental research design (pre and posttest) was used.

Setting:

The study was carried out on dialysis unit at Benha University Hospital, in Benha City. This unit provides a free dialysis service for a high flow rate of patients seeking medical services and nursing care.

Sampling:

Purposive sample included 120 patients, who received dialysis services at Benha University Hospital and met the inclusion criteria were selected to participate in the current study. **Inclusion criteria:** 1. Receiving hemodialysis for a minimum of three months. 2. Having the physical capacity to carry out regular tasks and bodily activities. 3. A desire to take part in the study. 4. Displayed normal cognitive abilities.

Tools of data collection:

Two tools were used to conduct and achieve the objectives of this study.

Tool I: A structured interviewing questionnaire: -

Following a review of pertinent literature, the researchers designed it. There were four parts:

Part one: Socio-demographic characteristics of the studied patients which included five items as (age, gender, educational level, occupation, and monthly income).

Part two: Patients' medical history which included seven items as (presence of other chronic diseases as hypertension, diabetes mellitus, cardiovascular disease and nephritis, number of hemodialysis sessions per week, number of hemodialysis hours per session, type of vascular access, time of starting hemodialysis, post hemodialysis session complains and taking analgesics for extended period).

Tool II: PRECEDE Model Questionnaire (Predisposing, Enabling, and Reinforcing factors Questionnaires), which adapted from (Green & Kreuter, 2005). It was developed by researchers after they reviewed the literature and drew ideas from the ecological and educational approaches of the PRECEDE model. It comprised the following parts:

Part one: Assessment Sheet for Predisposing Factors. This part divided into three sub section:

• **Section one: Knowledge Assessment Sheet:** It was conducted to assess knowledge of hemodialysis patients. It contained (27) questions in (4) areas of knowledge divided into: (14) on kidney disease and dialysis, (5) on medications for chronic renal failure and its complications, (4) on managing renal failure, and (4) on nutrition and exercise related to renal failure and dialysis.

Scoring System for the studied patients' total knowledge = 54

The total scores of knowledge developed as (2) score for each correct complete answer and (1) score for each correct incomplete answer, while zero for don't know. For each area

of knowledge, the scores of the items were summed -up and converted into a percentage. The patients' knowledge was considered good if the score of the total knowledge $\geq 75\%$ (≥ 40) degree considered average if it is equals 50- $<75\%$ (27- <40 degree) and considered poor if it is $<50\%$ (<27 degrees).

• **Section two: Hemodialysis patients' self-care behaviors scale**, it was adopted from (Shintanikeiko, 2014) to assess the level of universal self-care and health deviation self-care behaviors. This scale is divided into two categories:

(1): **Universal self-care:** It included 5 main domains with 35 items. It was distributed as the follows; patients' self-care about the dietary regulation (12 items), patients' self-care about food safety (5 items), patients' self-care about stress prevention (9 items), patients' self-care about exercise regulation (5 items), and patients' self-care about habit regulation (4 items).

(2): **Health deviation self-care behaviors** which consisted of 3 main domains with 25 items. It was distributed as follows; patients' self-care about shunt preservation (10 items), patients' self-care about therapeutic diet implementation (8 items) and patients' self-care about the observation of care instructions (7 items).

Total self-care behaviors score= 240

Each item was graded on a four- point scale, all items scored (1 to 4). The scores were distributed on four responses as the following: (not applicable at all =1, minimally applicable =2, somewhat applicable = 3, very applicable = 4). The scores of the items were added for each part and the total was divided by the number of items and converted into a percent score. The level of universal self-care behaviors of hemodialysis patients was considered adequate self-care behaviors level if the total scores ≥ 60 (≥ 144), while considered inadequate self-care behaviors level if the total scores < 60 (< 144).

• **Section three:** Patients' attitude towards self-care that was designed as Likert scale. This scale was adapted from (Poudineh et

al., 2020) and consisted of 10 items as (feel motivated to fistula care, feel that personal hygiene is very important ...etc.)

Scoring system:

The attitude questions were designed based on three levels Likert scales including "agree", "neutral", and "disagree" that were scored in 3,2,1 score respectively. Total attitude score = 30 scores, was expressed as a percentage and classified into: Negative attitude if less than 50% (>15 point), and positive attitude if more than or equal 50% (≥ 15 points)

Part two: Reinforcement factors assessment sheet: It included six questions (measure support and encouragement of husband, family, friends, and healthcare staff) to measure the support, encouragement and the persons who reinforcing patients for positive behaviors.

Part three: Enabling factors assessment sheet: It included six questions to measure the availability and accessibility of resources needed to enable behaviors change such as information resources, attending educational classes to educate patient about the disease and health-promoting lifestyle.

Scoring System for Reinforcing and Enabling Factors:

The scores were distributed on three responses as the following: (yes= 2, to some extent= 1, and no= 0).

Content validity

To assess the tools' content validity, the current study was presented to five academic nursing staff members who specialize in community health nursing. The academic nursing specialists' assessments of the appropriateness of the material and the clarity of the sentences guided the recommended adjustments.

Reliability

In order to make sure that two tools for gathering data contained generally homogenous items, the reliability was tested using the

Cronbach's Alpha coefficient (reliability for knowledge was 0.90, attitude was 0.91, behaviors was 0.89, reinforcing was 0.87, and enabling factors was 0.92).

Ethical considerations:

All ethical guidelines were followed by the researcher during conducting the study. The Benha University Faculty of Nursing's ethical committee gave its approval to the research concept; there is no risk to study participants during implementation of the research, and the study complied with general ethical standards for clinical research. Both anonymity and confidentiality are guaranteed. After outlining the study's purposes and securing their best participation and data confidentiality, the patients were asked for their verbal consent. Patients were reminded by the researchers that they could opt out of the study and that the questionnaires were anonymous. The patients had the complete right to withdraw from the study at any moment and without providing a reason.

Pilot study:

The pilot study was done on 10% (12) of the patients to ensure the tools' clarity and applicability as well as to determine how long it would take them to complete the questionnaire. Patients in the pilot study were included in the study.

Field work:

From the start of September 2022 to the end of February 2023, the actual fieldwork for data gathering began. Using previous techniques, the researchers went to the hemodialysis unit at Benha University Hospital in Benha City twice a week throughout the three work shifts (morning, afternoon, and evening). In certain weeks, the researchers collected data during the morning shift, while in the other weeks, they did it during the afternoon or evening shift. To meet new cases and all other patients in the hemodialysis unit, the researchers alternated two days each week. Data was gathered from patients to check their capacity to focus and to reduce the symptoms of azotemia one hour after beginning of their hemodialysis

session. The average number of interviewed patients was 5 patients/ week. The PRECEDE model was used to conduct the study. PRECEDE consisted of four steps of assessment, followed by planning, implementation and evaluation of relevant educational interventions based on assessment.

Assessment phase:

The aim of the study was explained by the researchers to the hemodialysis patients who agreed to participate and met the study's inclusion criteria during this phase. The researchers introduced themselves to the patients. After getting the patient's consent, the researchers took 35–40 minutes to gather information about the patient's sociodemographic characteristics, inquire about their medical history, and then assess their knowledge, self-care behaviors, and attitude using the prior study techniques. Enabling and reinforcing factors were also evaluated throughout this phase using the PRECEDE model questionnaire. The questions were posed by the researchers in this stage in a straightforward manner, taking into consideration the patients' illiteracy or poor level of education, and their answers were entered into the study tools. The primary goal of the data analysis was to offer a foundation for creating the teaching sessions.

Planning phase:

Following the determination of the PRECEDE model application's goal, a conversation regarding the study's materials, instructional strategies, and evaluation was conducted with the patients. Researchers in the Arabic language took the literature study into consideration when creating the PRECEDE model application. It was updated, set up, and prepared with the needs of the patients in consideration. Following the creation of the PRECEDE model application contents, the best teaching strategies and media for presenting these contents were chosen. The researchers created an instructional booklet with pictures.

Educational and ecological assessment phase:

To improve the self-care behaviors of the patients under study, the researchers evaluated

the predisposing, reinforcing, and enabling factors that result in behavioral change in this phase.

Administrative approval:

At this phase, an official approval was obtained from the Dean of Faculty of Nursing; Benha University to the director of Benha University Hospital, to carry out the study after explaining the purpose of the study and asking for permission to conduct the study. The purpose and title are already clear. Selected researchers coordinate crucial educational and intervention tasks, assign tasks, and schedule tasks. To gather the necessary data, the researchers conducted interviews with the study subjects. Based on the findings of the pre-intervention evaluation and the pertinent scientific literature that was available, an Arabic booklet was then prepared.

Implementation phase:

The PRECEDE model application was implemented over a 12-week period during this phase, and the study materials were distributed throughout 9 sessions (7 theoretical sessions and 2 practical sessions), with every session lasting 30 to 45 minutes. Each group in the study spent an hour and a half in total; the twenty groups made up of study participants. There were five to six patients in each group. The PRECEDE model was introduced at the start of the first session, and each subsequent session began with a review of the input from previous ones. As well as lectures and demonstrations, there were also re-demonstrations. Suitable media, including posters and booklets, were utilized.

The focus of the first and second sessions was on the patients' knowledge of renal failure and dialysis. In the first session, the researchers educated the patients on the definition, types, symptoms, causes, risk factors, diagnosis, and complications of renal failure. The second session covered the definition of hemodialysis, how hemodialysis machines work, different types of vascular connections and how to care for them (catheters, grafts, and fistulas), some health issues brought on by vascular connections and how to handle them, and techniques for reducing skin itching. The third session covered

the value of exercise as well as the types and frequencies of exercise that are permitted. The session also determined the permitted food categories and the proper serving sizes for each type. The fourth session covered hemodialysis's role in the treatment of renal failure, medication's side effects, how to calculate an acceptable weight, and methods for treating renal failure. The fifth session included topics such dietary regulation, food safety, controlling eating habits, dietary sources of several key vitamins and minerals, and how to improve one's immunity and prevent off illness. The sixth session covered some hemodialysis-related sexual problems and how to deal with it, as well as stress regulation, stress management techniques, and stress coping strategies. The seventh session, which focuses on social reinforcement and support, includes friends and family members who play great role in encouraging an appropriate diet and exercise.

Evaluation phase:

Following the implementation of the intervention, the impact of the PRECEDE model application was assessed again using the same techniques to assess the degree of improvement.

Evaluation of impact and outcome:

Impact evaluation; through questionnaire analysis and meetings with patients to ensure the presence of beneficial enabling and reinforcing elements, reevaluation of patients' changes in predisposing, reinforcing, and enabling factors after intervention activities. **Outcome evaluation:** reevaluation of patients' altered self-care behaviors and predisposing, enabling, and reinforcing factors.

Statistical analysis:

The Statistical Package for Social Science (SPSS) version 22 was used to analyze the data, which allowed for the computation of frequencies and percentages, means and standard deviations, and tests for statistical significance and associations using the Chi-square test (χ^2) and correlation to identify relationships between variables. P-values 0.05, 0.001, and >0.05 were regarded as statistically

significant, highly significant, and insignificant respectively.

Results:

Table (1): Demonstrates that the age group 40-<50 years old constitutes 55.8% of the studied patients with mean age \pm SD was 42.14 \pm 6.96, 74.2% of them were males, 50.8% of them had secondary education as well as 65% of them were governmental employees, and 64.2% and 64.2% having insufficient monthly income.

Table (2): Illustrates that chronic renal failure may result from hypertension and nephritis, which were present in 70% and 19.2% of the hemodialysis (HD) patients under study, respectively. 100 % of HD patients reported that they were scheduled for three times a week and four hours per session. It was also revealed that AV fistula was the type of hemodialysis for 85% of the studied patients. 48.3% of HD patients began receiving hemodialysis between one and five years ago. After a hemodialysis session, 40.8% and 42.5 of them claim to have muscle cramps and restlessness. 82.5% of them used analgesics for extended periods of time.

Figure 1: Indicates that 53.3% of the hemodialysis patients in the study had poor total knowledge regarding hemodialysis and self-care behaviors pre educational intervention implementation, but this percentage increased to 72.5% post educational intervention implementation.

Figure 2: Illustrates that 64.2% of the studied patients got their information about hemodialysis and self-care behaviors through internet or TV.

Figure 3: Explains that; 67.5% of the studied hemodialysis patients had inadequate total self-care behaviors score pre educational intervention implementation while improved to

72.5% of them had adequate total self-care behaviors score at educational intervention implementation.

Figure 4: Clears that; 33.5% of the studied hemodialysis patients had positive total attitude score pre educational intervention implementation while improved to 79% post educational intervention implementation.

Table 3: Shows that there were high significant differences in the mean score of knowledge, attitude, behavioral, reinforcing and enabling factors regarding hemodialysis and self-care pre and post educational intervention implementation at p value =0.000.

Table 4: Illustrates that there was a highly statistically significant differences between the studied patients' total knowledge level about hemodialysis and self-care behaviors before and after educational intervention implementation and their socio demographic characteristics (P=0.000).

Table 5: Clarifies that that; there was a highly statistically significant differences between the studied patients' total self-care behaviors of hemodialysis patients pre and post the educational intervention and their socio demographic characteristics at P= 0.000.

Table 6: Demonstrates that there were highly statistically significant differences between hemodialysis patients' total knowledge and their attitude and self-care behaviors pre and post educational intervention implementation (P=0.000).

Table 7: Illustrates that there were highly statistically significant differences between hemodialysis patients' total predisposing factors and their enabling and reinforcing factors pre and post educational intervention implementation (P=0.000).

Table (1): Frequency distribution of the studied patients regarding their socio demographic Characteristics (n=120).

Socio -demographic characteristics		No.	%
Age/years	< 20	3	2.5
	20-<30	5	4.2
	30-<40	24	20.0
	40-<50	67	55.8
	>50	21	17.5
Mean± SD= (42.14± 6.96)			
Gender	Female	31	25.8
	Male	89	74.2
Degree of education	Unable to read and write	25	20.8
	Basic education	29	24.2
	Secondary education	61	50.8
	University education or above	5	4.2
Occupation	Governmental Employee	78	65.0
	Free business	8	6.7
	Retired	14	11.7
	Not working/ housewife	20	16.7
Monthly Income	Sufficient and save	11	9.2
	Sufficient only	32	26.7
	Insufficient	77	64.2

Table (2): Frequency distribution of the studied patients regarding their medical data (n=120).

Medical data	No.	%
Presence of other chronic diseases:		
Hypertension	84	70.0
Diabetes mellitus	7	5.8
Cardiovascular disease	6	5.0
Nephritis	23	19.2
Sessions of hemodialysis weekly		
3 sessions	120	100.0
Hours spent receiving hemodialysis per session		
4 hours	120	100.0
Type of vascular access		
AV fistula	102	85.0
Hemodialysis catheter	18	15.0
Time of starting hemodialysis		
Less than 1	15	12.5
1-<5	58	48.3
5-<10	33	27.5
10+	14	11.7
Post hemodialysis session complaints		
Restlessness	49	40.8
Hypotension	9	7.5
Headache	8	6.7
Muscle cramps	51	42.5
Pain in the fistula	3	2.5
Taking analgesics for extended period of time		
No	21	17.5
Yes	99	82.5

Figure (1): Percentage distribution of the studied patients’ total knowledge level regarding hemodialysis and self-care behaviors pre and post educational intervention implementation (n=120).

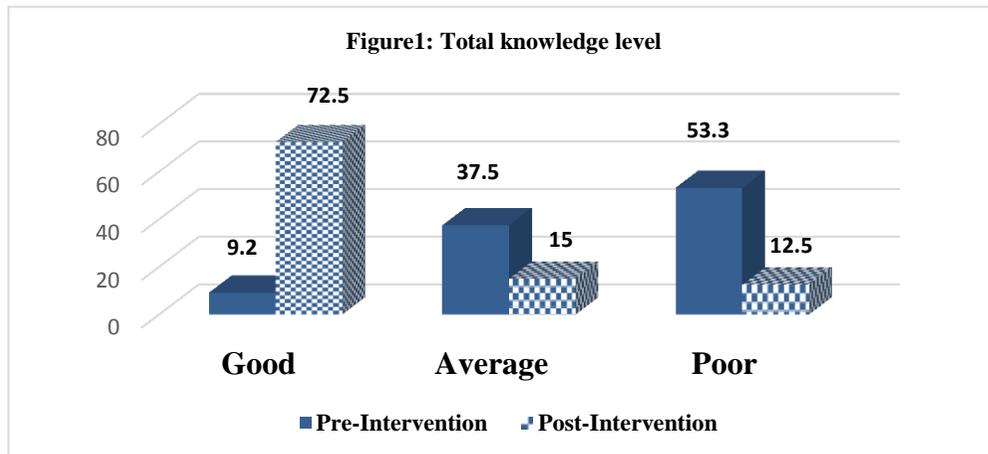


Figure (2): Percentage distribution of the studied patients’ source of information about hemodialysis and self-care behaviors (n=120).

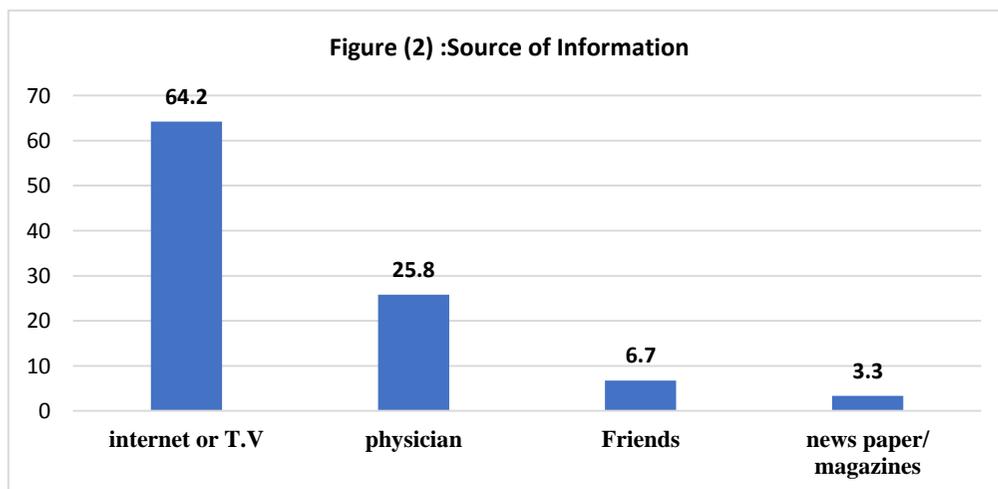


Figure (3): Percentage distribution of the studied hemodialysis patients' total self-care behaviors scores pre and post educational intervention implementation (n=120).

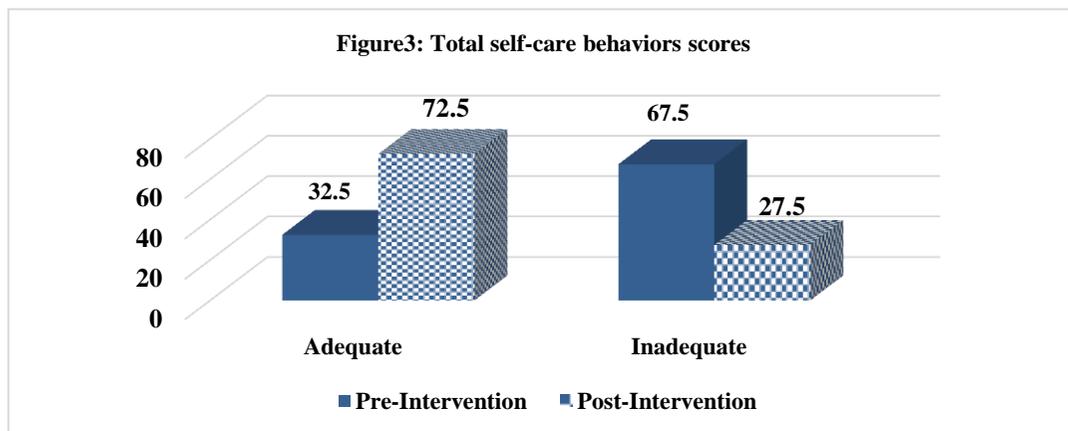


Figure (4): Percentage distribution of the studied hemodialysis patients' total attitude scores pre and post educational intervention implementation (n=120).

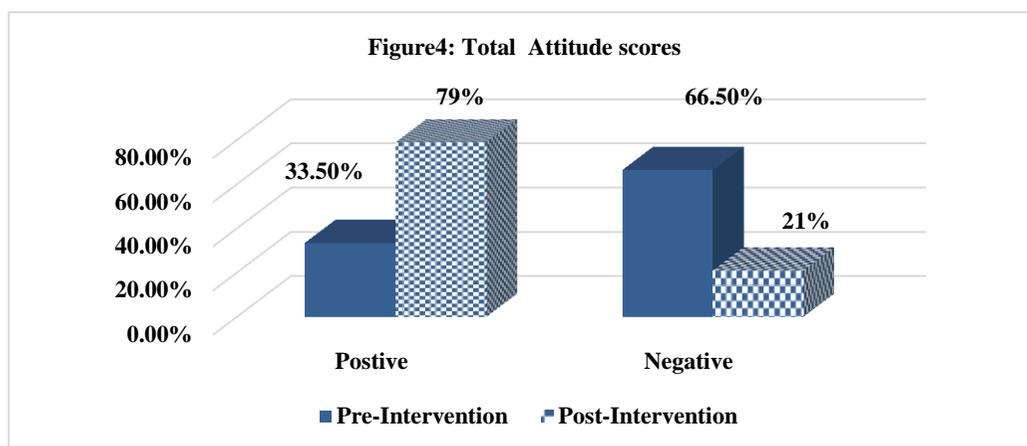


Table (3): Comparison of mean scores of educational and ecological diagnostic stages of PRECEDE model (predisposing, reinforcing, and enabling factors) of the studied patients regarding hemodialysis and self-care pre and post educational intervention implementation (n= 120).

Items	Pre -Intervention Mean± SD	Post -Intervention Mean± SD	T	P-value
Predisposing factors:				
Knowledge	16.32±9.30	30.66±11.20	14.14	0.000
Behaviors	8.33±4.47	13.93±3.70	8.27	0.000
Attitude	10.35±5.21	18.65±4.71	12.30	0.000
Reinforcing factors				
Enabling factors	4.90±3.88	9.20±3.80	8.30	0.000

Table (4): Relation between the studied patients' socio demographic characteristics & their total knowledge level regarding hemodialysis and self-care behaviors pre and post educational intervention implementation (n=120).

Socio-demographic characteristics		Total Knowledge Level									
		Pre - Intervention			Post - Intervention			X2	P-value		
		Good (%)	Average (%)	Poor (%)	Good (%)	Average (%)	Poor (%)				
Age/years	< 20	0.0	66.7	33.3	56.56	0.000	100.0	0.0	0.0	28.22	0.000
	20-<30	0.0	100.0	0.0			100.0	0.0	0.0		
	30-<40	16.7	0.0	83.3			75.0	12.5	12.5		
	40-<50	9.0	56.7	34.3			80.6	14.9	5.4		
	>50	0.0	0.0	100.0			33.3	23.8	42.9		
Gender	Female	16.1	22.6	61.3	25.18	0.000	83.9	9.7	6.5	19.75	0.000
	Male	6.7	42.7	50.6			68.5	16.9	14.9		
Educational Degree	Can't read and write	16.0	12.0	72.0	27.93	0.000	84.0	12.0	4.0	25.31	0.000
	Basic education	0.0	20.7	79.3			44.8	17.2	37.9		
	Secondary education	9.8	52.5	37.7			78.7	16.4	4.9		
	university education or above	20.0	80.0	0.0			100.0	0.0	0.0		
Occupation	Governmental Employee	7.7	48.7	43.6	30.06	0.000	78.2	17.9	3.8	45.65	0.000
	Free business	50.0	0.0	50.0			62.5	37.5	0.0		
	Retired	0.0	14.3	85.7			92.9	0.0	7.1		
	Not working/ housewife	5.0	25.0	70.0			40.0	5.0	55.0		
Monthly Income	Sufficient and save	9.1	63.6	27.3	27.42	0.000	90.9	0.0	9.1	21.89	0.000
	Sufficient only	12.5	0.0	87.5			50.0	15.6	34.4		
	Insufficient	7.8	49.4	42.9			79.2	16.9	3.9		

Table (5): Relation between the studied patients' socio demographic characteristics & their total self-care behaviors scores pre and post educational intervention implementation (n=120).

Socio demographic characteristics		Total self-care behaviors scores									
		Pre - Intervention				Post- Intervention					
		Very applicable (%)	Somewhat applicable (%)	Minimally applicable (%)	X2	P-value	Very applicable (%)	Somewhat applicable (%)	Minimally applicable (%)	X2	P-value
Age/years	< 20	0.0	33.3	66.7	74.62	0.000	66.7	33.3	0.0	26.36	0.000
	20-<30	0.0	50.0	50.0			50.0	25.0	25.0		
	30-<40	12.5	8.3	79.2			70.8	16.7	12.5		
	40-<50	10.4	23.9	65.7			77.6	13.5	8.9		
	>50	4.8	4.8	90.4			52.4	38.1	9.5		
Gender	Female	19.4	25.8	54.8	31.75	0.000	61.2	16.2	22.6	22.74	0.000
	Male	10.1	22.5	67.4			69.7	19.1	11.2		
Educational Degree	Can't read and write	24.0	20.0	56.0	33.54	0.000	76.0	16.0	8.0	24.13	0.000
	Basic education	6.9	24.1	69.0			51.7	34.5	13.8		
	Secondary education	13.1	37.7	49.2			80.3	13.2	6.5		
	University education or above	40.0	40.0	20.0			100.0	0.0	0.0		
Occupation	Governmental Employee	10.2	41.1	48.7	37.40	0.000	80.8	16.7	2.5	26.95	0.000
	Free business	50.0	0.0	50.0			62.5	37.5	0.0		
	Retired	0.0	21.4	78.6			85.8	7.1	7.1		
	Not working/ housewife	10.0	30.0	60.0			50.0	15.0	35.0		
Monthly Income	Enough and save	9.1	72.7	18.2	38.05	0.000	81.8	9.1	9.1	21.55	0.000
	Just enough	18.7	18.7	62.6			53.2	18.7	28.1		
	Not enough	10.4	48.1	41.5			79.2	18.2	2.6		

Table (6): Correlation between total knowledge of hemodialysis patients with their total attitude and total self-care behaviors pre and post educational intervention implementation (n=120)

Items	Total knowledge		Total Attitude		Total self- care behaviors	
	Pre	Post	Pre	Post	Pre	Post
Total knowledge	r	1	0.704	0.723	0.764	0.799
	P	-	.000**	0.000**	0.000**	0.000**
Total Attitude	r	0.704	1	1	0.836	0.836
	P	0.000**	0.000**	-	-	0.000**
Total self-care behaviors	r	0.764	0.836	0.867	1	1
	P	0.000**	0.000**	0.000**	0.000**	-

(**) highly Statistically significant correlation at P-value <0.001

Table (7): Correlation between total predisposing factors of hemodialysis patients and their enabling and reinforcing factors pre and post educational intervention implementation (n=120)

Items	Total Predisposing factors		Total Enabling factors		Total Reinforcing factors	
	Pre	Post	Pre	Post	Pre	Post
Total Predisposing factors	r	1	0.314	0.416	0.501	0.416
	P	-	0.000**	0.000**	0.000**	0.000**
Total Enabling factors	r	0.314	1	1	0.820	0.856
	P	0.000**	0.000**	-	-	0.000**
Total Reinforcing factors	r	0.501	0.820	0.856	1	1
	P	0.000**	0.000**	0.000**	0.000**	-

(**) Highly Statistically Significant at P-value <0.001

Discussion:

Chronic Renal Failure (CRF) is a kidney illness that progresses and cannot be cured. At this point, the body's capacity to preserve water and electrolytes and manage their balance would be ruined, which would lead to uremia. The renal function is also being harmed and destroyed. Numerous issues with the patient's life are brought on by this kidney malfunction, which necessitates the usage of kidney replacement therapy such hemodialysis, transplantation, and peritoneum dialysis (Mosavi et al., 2020).

The PRECEDE model created to serve as an evaluation framework for plans for health promotion and education. This model may be intended to lessen and prevent renal failure in many individuals with kidney disorders. It contains stages of social, epidemiological,

behavioral, educational, implementation, process assessment, and assessment of short-term and long-term outcomes. This approach is crucial for patients to update their information, alter their attitudes, encourage healthy habits, and possess the requisite (Kobra et al., 2020).

This study aimed to evaluate the effect of educational intervention on self- care behaviors of hemodialysis patients based on PRECEDE model.

Regarding to socio-demographic characteristics of the studied patients, the current findings showed that more than half of the studied patients aged between (41 to 50 years) with a mean age of 42.14 ± 6.96 years, slightly less than three quarters of them were males, slightly more than half of them had secondary education, less than two thirds of them were working as governmental employees

and had insufficient monthly income respectively.

According to the researchers, this may be because as people age, their kidneys' structure and function deteriorate and change. Additionally, as people age, their glomerular filtration rate gradually declines, falling by 25% by the age of 40. Additionally, there is a decrease in kidney weight and volume, which is linked to the typical comorbidities of the third age, increasing the renal system's vulnerability and leading to a loss of the kidneys' internal balance, putting these individuals at an increased risk of renal impairment. Gender may also have an impact on the occurrence of ESRF, particularly in men. thus, because men who work as farmers in Egypt are at risk for interstitial nephritis due to exposure to agrochemicals, dehydration, and ingestion of contaminated water. thus, risk may be related to the lifestyle of most men and the weight of work and associated stress. In addition, older men are susceptible to benign prostatic hyperplasia, which can impair kidney function by causing urine to reflux into the kidney. Also, for the majority of hemodialysis patients, renal failure patients may face financial difficulties due to limited income.

These results were in accordance with **Mosavi et al. (2020)**, reported that 61.8 percent of the intervention group in their study at Shahrekord University of Medical Sciences in Shahrekord, Iran, were men. and with the study done by **Goma et al. (2021)**, according to their study conducted in Tanta, Egypt, the average age of the patients their studied was 44.78 ± 6.52 , more than half (56.0%) of them were between the ages of 41 and 50, more than two thirds (74.0%) of them were men, and more than half (60.5%) of them had employees. Also, these results were incongruent with the study done by **Wahyuni et al. (2019)** which conducted in Surabaya, Indonesia, revealed that most of their respondents (77.2%) were between the ages of 46 and 59, more than half (53.2%) were females, and nearly half (46.8%) had high school as their most recent educational background. Also disagreed with **Hamza et al. (2021)**, their study study conducted at Beni Suf University in Egypt, 36.4% of the participants were between the ages of 20 and 40, with a

mean age of 38.61 ± 6.32 . Additionally, 30.9%, 34.6%, and 58.1% of them were illiterate, engaged in unpaid labor, or had low economic status, respectively.

Regarding the presence of other chronic diseases among hemodialysis patients, this study showed that hypertension (70%) was the most prevalent chronic disease, followed by nephritis (19.2%), diabetes mellitus (5.8%), cardiovascular disease (5%), and then nephritis. This might be due to, the fundamental causes of kidney failure, such as hypertension, glomerulonephritis, and others (including diabetes mellitus, congenital abnormalities, and polycystic kidney disease), may be to responsible for this. These results were contradicted with **Yang et al. (2019)**, their study done on China and reported that the most common type of primary cause of ESRD was chronic glomerulonephritis (29.2%), followed by hypertensive nephropathy (23.6%), diabetic nephropathy (16.7%), and other/unknown (21.3%). Polycystic kidney accounted for 9.3% of renal disorders. Also disagreed with **Ikiz et al. (2021)**, their study done on Manisa, Turkey and stated that the most common etiologies of CKD were cardiovascular disease (50.6%) followed by diabetes mellitus (42.5%) and other kidney disease (6.9%) and rising obesity, hypertension, or diabetes mellitus rates worldwide are also linked to an increase in CKD mentioned by **Clementi et al. (2020)**, their study done on Japan.

Regarding the number of hemodialysis sessions for the patients weekly and number of hours every session, the current study showed that all the studied patients were scheduled for three times every week and four hours per session. According to the researchers point, this might be because the patient's life will be drastically altered when he starts receiving dialysis treatment. He will need to attend his dialysis sessions on a regular basis, take his prescribed medications, and alter everything he eats and drinks. These result findings were in the same line with the study done by **El-Metwaly et al. (2017)**, in Mansoura University, Egypt and reported that all the entire study subjects attended three times/ week to hemodialysis sessions and more than three quarters of them (78.8%) spending four hours on

the session and also in agreement **Kalsoom et al. (2020)**, their study done on Peshawar, Pakistan and said that hemodialysis was a complicated treatment for CKD patients requiring many hospital or dialysis center visits (often, 2-3 times every week). Consequently, these patients may experience substantial changes in their everyday routines. but in accordance with the study of **Ghadam et al. (2018)**, in Jahrom, Iran and stated that 56% of their subjects attended three times /week to hemodialysis session also, disagreed with the study done by **Mehmood et al. (2019)**, in Lahore and reported that most of their subjects (95%) were scheduled for two times a week for hemodialysis.

As regard to type of vascular access, it was noticed that most of the studied patients had AV fistula. It could be because arteriovenous fistulas are recommended as the best vascular access for ESRD patients receiving hemodialysis. and this result was supported by **Abdelhamed et al. (2019)**, their study done in Mansoura University, Egypt and mentioned that 85% of their study subjects had fistula.

Regarding the time that the studied patients started hemodialysis, the present study revealed that less than half started hemodialysis from one to five years ago. This finding similar with **Atashpeikar et al. (2021)**, their study done on Tabriz, Iran and indicated that more than one third of their respondents 35.7% began hemodialysis sessions from 1-5 years but this result agreed with **Ikiz et al. (2021)**, who mentioned that (40.6%) of their participants had been receiving dialysis for between one and three years.

Concerning complaints of the studied patients after hemodialysis, the current study illustrated that more than two fifths of patients suffered from muscle cramps followed by restlessness then hypotension. This may be a result of their prolonged stay on the machine and the fact that interdialytic weight gain (IWG), a consequence of hemodialysis in CRF patients, is brought on by the impairment of renal excretion function. In addition to peripheral edema, pulmonary edema, an increased risk of dilatation and heart hypertrophy, increasing the value of the

interdialytic weight gain will have adverse effects such as hypotension, muscle cramps, and hypotension. These result findings were in opposition to the study of **Winkelmann et al. (2020)**, their study done on Brazil and reported that (49.1%) of their subjects complained of weakness followed by absence of symptoms (28.4%) then hypotension (23.5%) and finally nausea (22.4%).

The present study showed that the majority of the studied patients were taking medications for long periods of time as analgesics. This might occur because of taking drugs, which are crucial for hemodialysis patients to preserve their quality of life and function in daily life. The result of the current study was consistent with **Zain-ELdin et al. (2018)**, their study done on Egypt and found that majority of hemodialysis patients (81%) took medications for long period, but this result disagreed with **Hamza et al. (2022)**, their study done in Beni Suef University, Egypt and mentioned that more than half of their studied hemodialysis patients (54.5 %) were taking medications as analgesics for long period of time.

Concerning to hemodialysis patients' total knowledge, the present study illustrated that more than half of the studied patients had poor total knowledge score regarding hemodialysis and self-care behaviors pre intervention implementation and this percentage increased to less than three quarters of them had good total knowledge score post intervention implementation. This may be attributable to the model's role in knowledge enhancement, and it demonstrates the importance of educational interventions for enhancing knowledge. **(Slesnick et al., 2019)** stated that one of the most efficient ways to increase a patient's responsibility for changing or eliminating unhealthy behaviors is to increase their level of understanding through education. These findings were supported by **Bassiouny et al. (2019)**, their study done in Ain shams University, Egypt and reported that there was significant improvement in hemodialysis clients' knowledge at post program compared to pre-program, The researcher contends that the reason for the initial level of client knowledge prior to program implementation may be that the

medical staff failed to provide these clients with the necessary and required knowledge. Additionally, patients in their dialysis unit would not have had the opportunity to raise questions as frequently, either out of embarrassment or lack of information regarding the topics to be covered. This suggests that in order to help patients reach the appropriate degree of adherence, more communication and clarifications on the interpretation of adherence markers are needed.

Contrarily, interactions with researchers and client experiences resulted in the client's knowledge increasing, and there are few accounts of the client engaging in self-education. Also similar to **Alikari et al. (2019)**, who conduct a study on Western Attica and indicated that there was a significant difference in knowledge scores for their intervention group and with **Ebrahimi et al. (2019)**, their study done on Saudi kingdom and also stated a significant increase in the level of their patients' knowledge regarding hemodialysis after educational intervention implementation and also concur with **(Fadlalmola & Awad, 2020)**, their study done on Khartoum State, Saudi Arabia and revealed that in their results an improvement in various knowledge areas and showed that patients' knowledge about hemodialysis had improved from the pre- to posttest following the execution of the educational intervention program. In the posttest evaluation compared to the pretest evaluation, all knowledge components considerably improved ($p < 0.05$). This result finding wasn't in agreement with **Goma et al. (2021)**, who mentioned that less than half of their participants (42.5%) had poor total knowledge score and more than one quarter of them (26%) had good total knowledge score regarding hemodialysis.

Considering hemodialysis patients' source of information, the current study revealed that less than two thirds of the studied patients got their information about hemodialysis and self-care behaviors from internet or T.V then physician then friends. This might be due to the level of education of the studied subjects where more than half of them had secondary education and governmental employees understand how to use technology.

This result was consistent with **Zhang & Xu, (2021)**, who mentioned that a patient with a middle educational level may be able to learn about their condition and its treatment in a variety of ways, find it simple to grasp some self-care concepts and skills, and actively collaborate with the medical team to participate in the treatment to improve their capacity for self-care. Also agreed with **Santana et al. (2020)**, who reported that the most consulted sources of information about hemodialysis between their respondents are the Internet, health professionals and other peers' experience and congresses.

Concerning hemodialysis patients' total self-care behaviors, the current study demonstrated that more than two thirds of the studied patients had total inadequate self-care behaviors score pre intervention implementation, but this percentage improved to total adequate of less than three quarters of them post intervention implementation. This might be due to most of studied patients having a strong will to reduce dialysis' complications in addition to who are keen to assume daily living activities. The results of the current study didn't concur with the study of **Hamza et al. (2021)**, who found that 100 % of their hemodialysis' patients had inadequate practices regarding health behaviors. But the results were concurred with **Ramezani et al. (2019)**, their study done in Qom, Iran and found that total mean scores of hemodialysis patient's self-care practices of all dimensions improved at posttest than pretest.

In relation to hemodialysis patients' total attitude scores, the current study showed that; one third of the studied hemodialysis patients had positive total attitude score at pre intervention implementation while this percentage increased to more than three quarters of them at post intervention implementation. This might be because patients with arteriovenous fistulas are more likely to comply with care recommendations when they are accepted as having the disease. A person with a good outlook who is coping with illness becomes an active subject, looking for information and changing his lifestyle to accommodate his new circumstances. On the other side, a negative outlook when dealing with the condition may result in the issue of therapy

non-compliance. This unfavorable attitude among the participants toward AVF care may be brought on by the arteriovenous fistula's visual aspect as well as by the ongoing dialysis; The good picture created by this idea of having to be ruthless to survive may be at variance with this point of view. This dilemma might occasionally make it difficult to maintain the essential care for maintaining high-quality permanent venous access.

The current study found that there was high significant difference in the mean scores of knowledge, attitude, behavioral, reinforcing and enabling factors regarding hemodialysis and self-care pre and post intervention implementation at p value =0.000. This result was consistent with **Kobra et al. (2020)**, their study done on Zahedan, Iran, whose results demonstrated after the intervention, there were significant increases in the mean scores of knowledge, attitude, enabling factors, reinforcing factors, and self-care behaviors in the intervention group compared to the control group ($P<0.05$), also compatible with **Jeihoon et al. (2023)**, their study done on Shiraz, Iran and found that the mean score of all the PRECEDE model constructs in their study significantly increased after the intervention.

The results of this study revealed a highly statistically significant differences between the studied patients' total knowledge score regarding hemodialysis and self-care behaviors and their age, gender, educational level, occupation, and monthly income ($P=0.000$) at pre and post intervention implementation. This may be because the results highlight the need for intervention to better educate patients about adopting safe behaviors. These findings weren't agreed with **Bassiouny et al. (2019)**, who referred to that age and occupation were not significantly correlated with knowledge of clients about renal failure ($P > 0.05$).

As opposed to that, a strong relationship was found between the knowledge of HD clients and their education, as well as their knowledge of renal failure, food, fluid intake, vascular access, and medication. While incongruent with **Elsawi et al. (2019)**, their study done on Kasr Alainy, Cairo University, Egypt and stated that

Most of the participants' characteristics and their overall knowledge scores did not show any significant differences.

Considering relationship between the studied patients' socio demographic characteristics and their total self-care behaviors pre and post intervention implementation. The current study found a highly statistically significant difference between hemodialysis patients' practices regarding self-care for health behaviors and their all socio demographic characteristics, including age, gender, educational level, occupation, and monthly income, at $P=0.000$ pre and post intervention implementation. According to **(Wang et al., 2019)**, their study done on Taiwan and said that CKD is a chronic and progressive condition, a sizable component of CKD care should be provided by the patient. Studies already published have found a link between patient outcomes for CKD and self-management.

As a result, improving active patient participation, and efficient self-care behaviors play crucial roles in preventing the start of ESRD in addition to the assistance of health care professionals. The medication compliance, food control, and regular exercise habits of patients who took part in the CKD care program were greater. These result findings were concurred with **Atashpeikar et al. (2021)**, their study done in Bonab, Iran and reported that Self-care ability significantly correlated with various demographic factors, including age, gender, marital status, educational attainment, and socioeconomic level. Also, agreed with **Mahedy et al. (2018)**, their study done on Port Said, Egypt and cleared that there is statistically significant relation between self-care practices of the studied patients and their demographic characteristics as (education and gender).

Relating to correlation between the studied hemodialysis patients' total knowledge, their attitude and self-care behaviors pre and post model intervention, the present study demonstrated that there were highly statistically significant differences between hemodialysis patients' total knowledge and their attitude and their self-care behaviors pre and post model intervention ($P= 0.000$). This might be due to a lack of understanding of the disease and the

potential for improved self-care behaviors, it may be difficult to make collaborative decisions regarding the therapeutic plan. Patients with chronic renal disease must therefore understand the factors that influence their awareness related to the disease and their self-care practices.

These findings aligned with **Tsai et al., (2021)**, their study done on Taiwan and declared that strong self-care behavior scores were substantially correlated with high disease knowledge scores. Also agreed with **Hamza et al. (2021)**, their study showed that there was a statistically significant difference between the level of awareness of HD patients and their behaviors for universal self-care for health and health deviation self-care.

Concerning correlation between the studied hemodialysis patients' total predisposing factors and their enabling and reinforcing factors pre and post model intervention. The present study illustrated that there were highly statistically significant differences between hemodialysis patients' total predisposing factors and their enabling and reinforcing factors at pre and post model intervention ($P=0.000$). These findings were supported by **Mosavi et al. (2020)**, who stated, the PRECEDE model evaluates other behavioral aspects, such as reinforcing and enabling factors, in addition to predisposing factors.

Given the good findings of this study, which is one of the few researches on self-care in hemodialysis patients, it can be used in the sectors of education, research, and medicine. The development of healthy behaviors is influenced by predisposing, enabling, and reinforcing variables. These actions also influence one's level of health, which raises one's standard of living. To create interventions that improve chronic patients' quality of life, particularly those being on hemodialysis, this approach can be applied. In addition, nurses working in clinics might use the study's findings to satisfy patients' educational needs.

Conclusion:

It could be concluded from the results of the current study and the research hypotheses that: Health educational interventions based on

the PRECEDE model are successful in increasing the self-care behaviors of patients who are receiving hemodialysis. This model intervention raised the study subjects' capacity for self-care by enhancing their attitude, knowledge, and self-care behaviors scores. It also strengthened the research hypotheses' supporting variables and components.

Recommendations:

- Provide continuous and repeated educational program for hemodialysis patients to assure they have sufficient level of knowledge and self-care.
- Develop instruction guidelines for hemodialysis patients before starting HD sessions to improve their self-care practices about care of vascular access, importance of exercise, medications, and its side effects.
- Develop instruction model for dialysis nurses to follow practice of self-care behaviors by hemodialysis patients.
- Instructive guidelines about self-care practices should be provided to newly admitted patients.
- Use of additional research on a large number of samples to guarantee the generalizability of the findings.

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