Structured Teaching Program's Effect on Knowledge and Self-Management Behaviors for Hemodialysis Patients

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Abstract:

Background: Promoting the level of knowledge of patients through education is one of the effective factors in increasing the patient responsibility in eliminating or changing unhealthy behaviors. Also, improving self-management of hemodialysis patients needs empowering the patients through educational program. **Aim:** to assess the effect of structured teaching program on knowledge and self-management behaviors for hemodialysis patients. **Subjects and method: Design:** A quasi-experimental (pre- post-test) design was used. **Setting:** The study was conducted in hemodialysis unit at Qena General Hospital. **Subjects:** A convenient sample consisted of 100 adult patients were selected based on the following inclusion criteria; their age between 18-65 years, and able to provide oral consent they were followed up for three months. **Tools:** Three tools were used for data collection; (I) patient's assessment sheet, (II) the hemodialysis knowledge questionnaire and (III) the hemodialysis self-management instrument. **Results:** Main results for this study showed that only 17% of studied patients had satisfactory level of knowledge in pretest, which increased to 93% in post-test. There was a statistically significant difference as regard hemodialysis self-management behaviors post implementing the structured teaching program P- value <0.001*. **Recommendations:** Continuous educational programs should be planned and offered to patients on regular basis in hemodialysis units. Also, further studies about home self- management of hemodialysis patients should be conducted.

Key words: Hemodialysis, Educational Program, Knowledge, Self-management Behavior.

Introduction

Chronic Renal Failure (CRF) is a progressive irreversible decline in renal function in which body is unable to keep metabolic fluid and electrolyte balance resulting in uremia and azotemia [1]. The occurrence and the prevalence of CRF are gradually increasing-by 8%-worldwide, mainly in developing countries [2]. Chronic kidney disease takes about 10 to 15 years to set in and therefore, it is vital to take the preventive measures at the earliest stage. If not doing it can lead to kidney failure, which is managed in two ways i.e., dialysis and/or transplant [3].

Hemodialysis (HD) is a technique that is used to accomplish the extracorporeal removal of waste substances such as urea, creatinine and free water from the blood when kidneys are in a state of renal replacement therapies [4]. Patients undergoing HD have multiple problems, such as retention of water and sodium, anemia, hypertension, and heart disease [5]. These patients are not only treated for problems associated with HD, such as atherosclerosis, left ventricular hypertrophy [6] and secondary hyperparathyroidism, but also for changes in self-perception and sometimes for reversal of roles in the family [7,8]. Patient start dialysis treatment, his life will be thoroughly changed, he should attend regularly the dialysis session, modify anything eats or drink, and use of prescribed drugs [9,10].

Disease related knowledge for patients undergoing HD is a vital part for health-related quality of life [11]. Many benefits associated with improving patients' knowledge of their HD treatment and improve ability to management their selves, including that it can empower individuals to become confident enough to make medical decisions [12]. High levels of disease-related knowledge can lead to self-efficacy, autonomy, and participation in clinical decision-making [13].

Self-management is defined as patient's skills to handle the symptoms, treatments, psychosocial and physical impacts and to adopt the style of living with a chronic disease [14]. Self-management needs patient engagement; however, the degree to which patients are able or willing to participate in self-management can differ, and individual and health system factors may serve as barriers or facilitators to self-management processes [15]. One strategy to improve patient outcomes is to improve the self-management using appropriate training or educational programs [16]. Patients' understanding of disease related knowledge is a vital aspect of successful self-management [17].

Several studies have indicated that patient who are self-managing their care process, improved coping and adjustment with

long-term health problems, quality of life, treatment adherence, physical and psychological well-being and reducing the risk of morbidity and mortality [18]. Educational interventions for patients undergoing HD can lead to a change in their behaviors. This may affect, in the long term, the frequency of associated complications and improve their live. So, nurse working in HD unit should plan and manage the care that patients receive [19].

Significant of the study

Improving self-management level in patients undergoing hemodialysis is an effective way to decrease the incidence of complications and mortality. Self-management education is not only intended to assist patients to live better but also it reduces the cost of the disease by increasing the skills of the patients in dealing with a serious illness [20]. Therefore, the researchers choose Qena General Hospital to conduct this study.

Aim of the Study

To assess the effect of structured teaching program on knowledge and self-management behaviors for patients undergoing hemodialysis.

Specific objectives:

1. To assess patients' knowledge regarding hemodialysis.

2. To assess patients' self-management behavior regarding hemodialysis.

3- To explore relationship between patients' knowledge and their self-management behaviors.

Research Hypothesis:

1. Knowledge of the study patients will be improved after implementing structured teaching program.

2. Self-management behaviors of the study patients will be improved after implementing the nursing teaching program.

3- Patients who have satisfactory knowledge will have better self-management behaviors.

Subjects and Methods

Research design: -

A quasi-experimental pre-posttest design was utilized to conduct this study.

Study Setting:

The study was conducted in hemodialysis unit at Qena General Hospital.

Study Duration: the study took about one year from the beginning of May 2019 until the end of May 2020.

Sample size: Convenience sample was used to achieve the aim of the study. It composed of 100 adult patients diagnosed with chronic renal failure (undergoing HD), and the patients were recruited based on the following inclusion criteria. Aged 18-65 years of both genders, and able to communicate effectively and provide oral consent.

Tools for Data Collection:

Three tools were used for data collection:

Tool I- Patients' assessment sheet: It was developed and utilized by the researchers based on literature review. This tool consists of the following two parts:

Part 1: Socio demographic data include (name, age, gender, education, employment and marital status).

Part 2: Medical data including: years on HD, type of vascular access, number of dialysis sessions per week, etiology of chronic kidney diseases and associated diseases.

Tool II- The Hemodialysis Knowledge Questionnaire: It was established by Gela and Mengistu, (2018) [21] to measure the knowledge about hemodialysis. It contains 16 items include (Lab tests: hematocrit and/or hemoglobin are used to detect anemia, creatinine is a lab test that measures kidney function, during dialysis, good things (like medication) are removed along with waste, when kidneys fail, they stop making the hormone called erythropoietin, healthy kidneys control balance of fluid, glucose, proteins, sodium and potassium, the target blood phosphorus for dialysis patients is about 3.5 to 5.3mg/dl, regular exercise has been linked with fewer hospital stays, phosphorus is quite rare and is not present in many foods, the machine alarms mean patients never

have to worry about safety, a low protein diet may be recommended while kidneys are failing, untreated anemia causes low energy feeling cold all the time and sometimes shortness of breath, limiting dietary potassium helps prevent heart problems, low fluid intake between dialysis treatments helps make treatments comfortable, dry weight is what a person weighs without the build-up of excess fluid, during dialysis wastes from blood move into the dialysis fluid, and more dialysis is better, because healthy kidneys work 24 hours a day).

Scoring system:

For each question the score was graded as "1" for correct answer, and "0" incorrect answer. The scores were totaled and converted into a percentage score. The total score is divided into the following: Satisfactory level of knowledge ≥50 % and unsatisfactory knowledge <50%.

Tool III - Hemodialysis Self-Management Instrument (HDSMI): It was established by Gela and Mengistu, (2018) [21] to assess self-management behaviors about HD. This scale consists of 20 items, which are divided into four subsequent subscales: problem solving (5) items, self-care (7) items, partnership (4) items and emotional management (4) items. Patients were asked to provide answers to each item on 4-point scale ranging from never (1) to always (4).

Scoring system:

The scores ranged from 20 to 80. The scores of each question were summed up and then converted into a percent score. A score of 50% or higher was considered satisfactory level of self-management and less than 50% considered un satisfactory level of self-management.

Validity of the Study Tools:

Content validity was tested by five experts from Faculty of Nursing in the field of medical surgical and administration at Qena University.

Administrative Design:

Permissions for data collection were obtained from the Hospital directors and head managers of the Hemodialysis Unit, and by the submission of a formal letter from the Faculty of Nursing, Qena University. An exploratory visit was done to HD unit to evaluate the rate of admission and suitable time for collecting data. Moreover, personal communication was done with nurses and physicians to explain the purpose of the study and gain their best possible cooperation.

Operational Design:

It clarifies steps of actual application of the study, and includes preparatory phase, pilot study, and field work.

Preparatory phase:

It took about two months started in May 2019 to end of June 2019 which included reviewing related literatures. Tools were translated by researchers into Arabic language and retranslated into English for correctness. The structured nursing program developed by the researchers. It comprises knowledge and self-management behavior needed for patient under HD, which in turn reflected on their health condition.

Pilot Study: A pilot study was conducted on (10%) 10 patients to test the clarity and applicability of the tools, test wording of the questions and estimate the time needed for the interview. Also, to detect any obstacles or problems that might arise in data collection. Data obtained from the pilot study were analyzed; no modifications were done, so, the patients participated in the pilot study were included in the main study.

Reliability: The reliability of tools was tested on 10 patients under hemodialysis order to measure the internal consistency of these tools by using Cornbrash's alpha test for knowledge was 0.81 and for self-management 0.84 in this study.

Field Work: After warranting the suitability and easiness of study tool, the researchers met with patients to explain study aim to them, and to get oral consent for participation; then, patients who fulfilled the inclusion criteria were interviewed individually by the researchers using previous tools to obtain the baseline data (pretest phase). The interview took

around 30-45 minutes according to the interviewers' level of understanding and comfort. The numbers of telephone of all patients under study or caregivers were taken to arrange for program sessions.

The structured educational program conducted on 5 groups. Each group included 20 patients; time elapsed 30-45 minutes/session. Teaching methods included demonstration, Power Point and pictures use). Each patient obtained a copy of the nursing teaching program booklet in simple Arabic language. Evaluation phase made immediately after implementing the program and after 3 months.

Ethical Consideration

There was no risk for study subjects during application of the research, the study followed ethical principles in clinical research, and formal consent was gained from patients who were willing to participate in the study, after clarifying the nature and aim of the study, confidentiality and anonymity were assured, patient had the right to refuse to participate and/or withdraw from the study without any rational at any time, and patent's privacy was considered during data collection.

Statistical Analysis:

Data entry and data analysis was done using compatible personal computer by investigator. The statistical analysis was done using SPSS version 22 (Statistical package for Social Science). Data were presented as number, percentages, mean, and standard deviation. Chi –Square test was used to compare between qualitative variables. An independent sample t-test was used to compare quantitative. P –value considered statistically significant when P value < 0.05.

Results:

Table (1): illustrates socio-demographic characteristics of the studied patients. The data in this table showed that (35%) between 35-40 years old. Regarding Gender; slightly more than half of the studied patient (51.0%) were female. Looking at level of education it was found that more than half of the studied samples **(58.0%)** were illiterate. In addition to marital status, it was observed that (64.0%) of them were married. Regarding to employment, it was noticed that (42.0 %) were skilled worker.

Table (2): reveals medical data of the studied patients. The data in this table demonstrated that the majority of the studied patients (92.0%) have Arterio Venous Fistula (AVF) as vascular access and all patients (100.0%) perform hemodialysis three times per week. In addition, it was found that slightly more than half (53.0%) of the studied sample hadn't associated disease and more than one third (35.0%) were hypertensive.

Table (3): illustrates distribution of the studied patients regarding to their

Knowledge about HD pre and post-tests. It was notice that, there were statistically significant differences for all items of hemodialysis knowledge except for items eight and eleven (P-value = 0.159 and 0.228) respectively.

Table (4): this table demonstrated that, there was a statistically significant difference as regard hemodialysis self-management behaviors in pre and post test. P- Value <0.001*.

Table (5): showed that, there was a statistically significant mean knowledge score of the studied patients were aged < 35 years was 7.88 ± 1.93 in pre- tests; it was improved to 13.06 ± 1.65 in post- test. This was significantly better than in pretest P= 0.002*. Also, it was found that the studied patients who are illiterate the mean score was 7.38 ± 1.36 in pre- test and it was improved to 11.86 ± 1.82 in post-test. This was significantly better than in pretest. P = 0.000.

Table (6): reveals relation between knowledge score and HDSM score and its domains pre and post tests. The data in this table illustrated that; there was a statistically significant relation between level of knowledge and self-management behavior with P-value= 0.000.

Fig (1): The data in this figure demonstrated that only 17 of studied patients have had satisfactory level of knowledge and 83 unsatisfactory in pretest while, about 93 have had satisfactory level of knowledge and only 7 of them have had unsatisfactory knowledge in post test.

Table (1): Distribution of Studied Patients regarding to their Socio-Demographic Characteristics **(N=100)**

Variables	No.	%
Age: (years)		
< 35	34	34.0%
35- 40	35	**35.0%**
≥ 40	31	31.0%
Mean ± SD (Range)	**39.28 ± 11.66**	
Gender:		
Male	49	49.0%
Female	51	**51.0%**
Level of education:		
Illiterate	58	**58.0%**
Read & write	28	28.0%
Basic education	2	2.0%
Secondary	6	6.0%
University	6	6.0%
Marital status:		
Single	26	26.0%
Married	64	**64.0%**
Divorced	6	6.0%
Widowed	4	4.0%
Employment:		
Employee	31	31.0%
Skilled worker	42	**42.0%**
Housewife	27	27.0%

Table (2): Distribution of the Studied Patients as regard their Medical Data **(N=100)**

Variables	No. (100)	%
Years on hemodialysis:		
1-3	39	**39.0%**
4-6	23	23.0%
> 6	38	38.0%
Mean ± SD (Range)	**5.13 ± 2.86 (1.0-13.0)**	
Vascular access:		
Arteriovenous Fistula (AVF)	92	**92.0%**
Arteriovenous Shunt (prosthesis)	18	18.0%
Etiology of CKD:		
Recurrent nephritis and pyelonephritis	21	21.0%
Analgesics	19	19.0%
Hypertension	35	**35.0%**
Kidney stones (Calcium oxalate)	21	21.0%
Pre-eclampsia	4	4.0%
Number of dialysis sessions per week:		
Three times	100	100.0%
Associated diseases:		
No	53	**53.0%**
Diabetes mellitus (DM)	4	4.0%
Hypertension (HTN)	35	35.0%
Cardiac diseases	8	8.0%

Table (3): Distribution of the Studied Patients regarding to their Knowledge about HD pre and post tests **(N=100)**

Variables	Pre-test				Post-test				P-value
	Correct		Incorrect		Correct		Incorrect		
	No.	%	No.	%	No.	%	No.	%	
1-Lab tests: hematocrit and/or hemoglobin are used to detect anemia	48	48.0	52	52.0	100	100.0	0	0.0	0.000*
2-Creatinine is a lab test that measures kidney function	47	47.0	53	53.0	92	92.0	8	8.0	0.000*
3-During dialysis, good things (like meds) are removed along with waste	47	47.0	53	53.0	89	89.0	11	11.0	0.000*
4-When kidneys fail, they stop making the hormone called erythropoietin	26	26.0	74	74.0	68	68.0	32	32.0	0.000*
5-Healthy kidneys control balance of fluid, glucose, proteins, sodium & potassium	65	65.0	35	35.0	85	85.0	15	15.0	0.001*
6-The target blood phosphorus for dialysis patients is about 3.5 to 5.3	30	30.0	70	70.0	58	58.0	42	42.0	0.000*
7-Regular exercise has been linked with fewer hospital stays and better overall health for people on dialysis	10	10.0	90	90.0	47	47.0	53	53.0	0.000*
8-Phosphorus is quite rare and is not present in many foods	67	67.0	33	33.0	76	76.0	24	24.0	0.159
9-The machine alarms mean patients never have to worry about safety.	54	54.0	46	46.0	81	81.0	19	19.0	0.000*
10-A low protein diet may be recommended while kidneys are failing, but a high protein diet is better once they have failed completely	41	41.0	59	59.0	71	71.0	29	29.0	0.000*
11-Untreated anemia causes low energy feeling cold all the time and sometimes shortness of breath	88	88.0	12	12.0	93	93.0	7	7.0	0.228
12-Limiting dietary	36	36.0	64	64.0	54	54.0	46	46.0	0.011*

potassium helps prevent heart problems in dialysis patients								
13-Low fluid intake between dialysis treatments helps make treatments comfortable	42	42.0	58	58.0	73	73.0	27	27.0	0.000*
14- Dry weight is what a person weighs without the build-up of excess fluid.	67	67.0	33	33.0	84	84.0	16	16.0	0.005*
15-During dialysis, wastes from blood move into the dialysis fluid	59	59.0	41	41.0	80	80.0	20	20.0	0.001*
16-More dialysis is better, because healthy kidneys work 24 hours a day	67	67.0	33	33.0	84	84.0	16	16.0	0.000*

* Statistically significant at p<0.05

Table (4): Distribution of studied sample regarding to their Hemodialysis Self-Management (HDSM) and their total score pre and posttests (N=100)

HDSMI	Pre-test	Post-test	P-value
	Mean ± SD	Mean ± SD	
1-Partnership	12.25 ± 2.13	13.84 ± 1.72	<0.001*
2-Problem-solving	12.28 ± 2.81	15.77 ± 2.50	<0.001*
3-Self-care	20.80 ± 2.51	24.38 ± 2.89	<0.001*
4-Emotional-management	9.08 ± 2.41	12.60 ± 2.25	<0.001*
HDSMI	54.41 ± 6.23	66.59 ± 6.37	<0.001*

* Statistically significant at p<0.05

**Table (5):** Relationship between knowledge score and HDSMI score with socio demographic (N= 100)

	Knowledge score		HDSMI score	
	Pre-test	Post-test	Pre-test	Post-test
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age: (years)				
< 35	7.88 ± 1.93	13.06 ± 1.65	54.71 ± 7.23	68.06 ± 7.04
35-40	7.97 ± 1.58	11.43 ± 1.67	54.46 ± 3.13	64.97 ± 5.17
≥ 40	7.97 ± 2.14	12.10 ± 2.17	54.03 ± 7.70	66.81 ± 6.60
P-value	**0.976**	**0.002***	**0.910**	**0.128**
Gender:				
Male	7.98 ± 2.30	13.06 ± 1.72	53.84 ± 6.58	67.78 ± 6.32
Female	7.90 ± 1.36	11.35 ± 1.76	54.96 ± 5.89	65.45 ± 6.26
P-value	**0.837**	**0.000***	**0.370**	**0.068**
Level of education:				
Illiterate	7.38 ± 1.36	11.86 ± 1.82	52.81 ± 4.67	65.59 ± 6.36
Read & write	8.21 ± 1.64	12.54 ± 2.08	54.29 ± 5.13	68.32 ± 4.86
Basic education or more.	9.71 ± 2.81	12.86 ± 1.96	61.29 ± 9.13	67.29 ± 8.41
P-value	**0.121**	**0.000***	**0.000***	**0.159**
Marital status:				
Single	8.08 ± 2.02	12.85 ± 1.99	55.31 ± 7.02	66.92 ± 8.36
Ever-married	7.89 ± 1.82	11.96 ± 1.88	54.09 ± 5.95	66.47 ± 5.57
P-value	**0.666**	**0.044***	**0.396**	**0.758**

* Statistically significant at p<0.05

Table (6): Relation between knowledge score and HDSM score and its domains pre and post tests (N=100)

HDSM score	Knowledge Score	
	Pre-test	Post test
	P-value	P-value
1- Partnership	0.011*	0.000*
2- Problem-solving	0.032*	0.000*
3- Self-care	0.010*	0.001*
4- Emotional-management	0.006*	0.000*
HDSMI	**0.000***	**0.000***

* Statistically significant at p<0.05
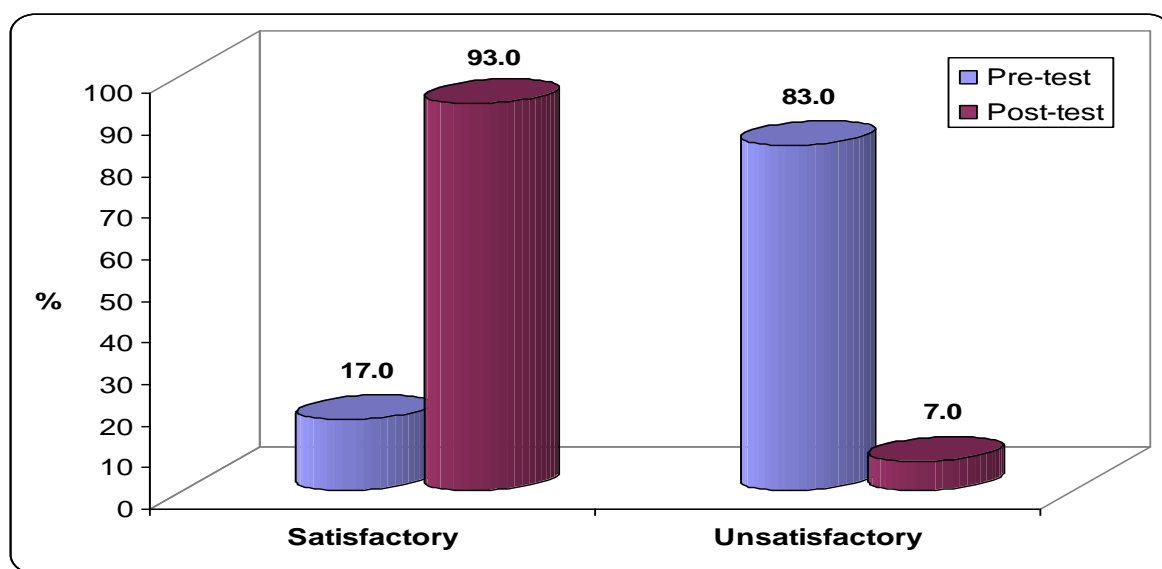
Fig (1): Percentage of total knowledge of Studied Patients regarding HD pre and post tests (N=100)

< 50% Unsatisfactory   ≥ 50% Satisfactory

Discussion

Chronic renal failure is a universal community health problem. It is defined as a decrease in the renal function from mild damage to moderate and severe chronic kidney failure [22]. HD is the most frequently used treatment method for chronic renal failure [23]. HD is a treatment to filter wastes and water from the blood. It helps control blood pressure and balance important minerals, such as sodium, potassium, and calcium, in blood [24].

Patients maintained on HD who learn about their disease and its treatment, and who successfully self-manage at least some aspects of their own health care, may experience improved functioning and well-being and increased overall quality of life, while simultaneously experiencing decreased risk for hospitalization and mortality [25].

Findings regarding Socio- demographic characteristics of the study sample; the present study revealed that; more than two quarters of the study sample were married and more than thirds were skilled worker. These results in line with **Ali et al. (2011)** [26] who found in their study that, the highest proportion of patients were married and skilled worker. Slightly more than one third of the studied sample their ages range between 35-40 years old which came in accordance with **Mahmoud and Abd Elaziz (2015)** [27] who reported that

slightly more than one third of the studied sample their ages range between 40- 50 years old. Also, the result is consistent with **Shah and Pokhare (2013)** [28] who found that the majority of the patients belonged to age group of 52-72 years.

The study results revealed that, slightly more than half of the study samples were female. This result is agreement with **Sittisongkram et al. (2019)** [29] who reported that more than half of the studied patients were female. Also, this result is contradicting with **Fernandes and D'silva (2020)** [30] who found that the majority of clients were males. Also, more than half of the sample were illiterate this finding in line with **Bahadori et al. (2014)** [31] who reported that the highest percentage of the studied sample were illiterate.

Findings regarding medical data of the study sample; in this study all studied patients perform dialysis sessions three times per week. This result inconstant with **Ranadive et al. (2019)** [32] who found that more half of patients perform dialysis session 3 times per week. The present study revealed that hypertension was the main etiology of chronic renal failure (CRF) which came in accordance with **Jebraeily and Makhdoomi (2018)** [14] who reported that hypertension was the most common cause of CRF among the studied patients.

The current study reported that the majority of studied patients have AVF as vascular access. This finding consistent with **Ferreira et al. (2018)** [33] in a study about Knowledge: disease process in patients undergoing hemodialysis who found that the prevalent dialysis site was AVF.

Findings regarding knowledge of studied patients about hemodialysis; the finding of this study denote that the majority of patients have unsatisfactory knowledge about hemodialysis. Meanwhile, this finding isn't confirmed with **Gela and Mengistu (2018)** [21] who found that more than half of the respondents had knowledge about hemodialysis. This finding may be attributed to the nature that highest proportion of patients is illiterate and this may affect their ability to learn and seek help and information.

The results of this study showed significantly increased of total knowledge score of studied patients about hemodialysis post implementing the teaching program. This finding came in agreement with **Saelim et al. (2011)** [34] who revealed that, the health education program significantly improved knowledge of hemodialysis patients about the disease.

This study also revealed that there was positive significant relation between total knowledge score and the studied patients who their age < 35 years post implementing the program. This could be explained by the fact that this age group has more motivation and a willingness to learn and acquire information. Also, positive significant relation between total knowledge score and illiterate patients was found after implementing the teaching program. This is because they represent the majority of the study patients.

The present study also showed that there was positive significant relation between total knowledge score and single patients post implementing the nursing program. This result may be because singles have fewer responsibilities and psychological pressures, so they are better prepared to receive the information.

Findings regarding self-management of study sample regarding hemodialysis; this study declared that, there was a statistically significant difference after implementing the nursing teaching program as regard self-management behaviors about hemodialysis. In line with this result of the current study, the study of **Ramezani et al. (2019)** [35] showed that educational approach was effective in improving self-management of patients.

Lastly, the present study reported that there was a statistically significant relation between level of knowledge and self-management behavior. This result came in line with **Gela and Mengistu (2018)** [21]

who reported that patients' knowledge was found to be independent predictors of self-management. This result may be attributed to the nature that as the patient become more knowledgeable about his disease his self-management level will be better.

Conclusion

Based on the results of the present study we can be concluded that structured teaching program was found to be effective in enhancing knowledge and self-management behaviors among patients undergoing hemodialysis.

Recommendations

Based on the results of the study, the following recommendations are suggested:

1. Continuous educational program should be planned and offered to patients on regular basis in hemodialysis units.

2. Using strategies for knowledge reinforcement and skills improvement can improve patients' knowledge and self-management regarding hemodialysis.

3. Replication of the study on different settings and large sample size to generalize the results.

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