

Effect of Educational Guidelines on Knowledge, Health Care Practices, and Dependency Level for Patients Undergoing Hemodialysis

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Abstract

Background: End Stage Renal Disease (ESRD) is one of the major health problems worldwide. **Aim of the study:** Was to evaluate the effect of educational guidelines on knowledge, practice, and dependency level for Patients with ESRD undergoing hemodialysis. **Subjects and methods: Research design:** A pre/posttest quasi experimental design was used to achieve the study aim. **Setting:** The study was established in hemodialysis unit at Zagazig University Hospitals, Egypt. **Subjects:** Purposive sample of 60 adult patients with ESRD undergoing hemodialysis. **Data collection tools:** An interviewing questionnaire for patients, patients' health care practices about special care, and Dependency level assessment questionnaire. **Results:** A significant improvement was detected in patients' knowledge and practice post educational guidelines than pre educational guidelines ($p < 0.01$). Also, 20% of studied patients were dependent in performing daily living activities before educational guidelines; meanwhile they were slightly decreased to 15% after the educational guidelines. **Conclusion:** It can be concluded that, the development of educational guidelines showed a significant effect on improvement patients' knowledge, practices, together with modifying the dependency level. **Recommendation:** Carry out different related educational guidelines and counseling sessions for patients with ESRD regarding proper intervention, healthy lifestyle, and coping strategies.

Key words: Educational Guidelines, Dependency level, Hemodialysis.

Introduction

Chronic Kidney disease (CKD) refers to all kidney conditions persisting at least three months, affecting removal of waste from the blood by the kidney (referring to kidney dysfunction), and/or leakage of protein or albumin in the urine (referring to kidney damage). CKD is common, costly and often detected too late to be reversible, but it is broadly preventable due to many modifiable risk

factors (**Kidney Educational Australia 2019**).

Chronic kidney disease (CKD) is a public health issue affecting about 46 million individuals in the US (**Whitney et al., 2020**). Unfortunately, nearly half of adults with compromised kidney function who are not on dialysis are unaware that they have CKD because CKD is nearly asymptomatic in the early stages. So, there is need to identify individuals at risk for CKD in order to develop specific strategies for CKD prevention, treatment, and management (**Centers for Disease Control and**

Prevention, 2019). The prevalence of chronic kidney disease (CKD) is increasing worldwide, and the mortality rate remain high (**Lousa et al., 2021**).

End-stage renal disease (ESRD) is the last stage of chronic kidney disease, where kidney function gradually declines over time. Patients with ESRD have significant and permanent loss of kidney function and require regular dialysis (a procedure that removes harmful waste products from the human bloodstream) or akidney transplantation for survival (**Sgambat, et al., 2019**).

End-stage renal disease is one of the major health issues around the world, and it can cause economic burden to societies and health care systems (**Arad et al., 2021**). In the United States more than 500,000 individuals suffer from end-stage renal disease (ESRD). The progression of chronic kidney disease (CKD) to this incurable disease remains a significant cause of poor quality of life and significant mortality (**Scott et al., 2020; Benjamin & Lappin, 2021**).

Dialysis is the best strategy for expelling accumulated poisons from the body and improving quality of life. However, this procedure alone can complicate the condition due to side effects. Chronic Renal Failure (CRF) patients, who are on dialysis, may be at increased cardiovascular and metabolic hazard (**Clements et al., 2020**). It is well known that dialysis patients have significantly impaired functional outcomes and vascular stiffness (**Gadaen et al., 2021**). Today, dialysis is also widely used for mild treatable kidney problems. It is urgent to teach CRF patients about facts around their illness, drugs, dietary regimen, and the different measures needed to monitor their illness (**National Committee for Quality Assurance, 2021**).

Functional status is the ability of the person to perform activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Decreased functional status makes the patients dependent on others to perform their ADLs and IADLs. Functional dependence is a problem that present early in life of chronic ill patients, as in chronic kidney disease, including those with end-stage renal disease (ESRD) undergoing maintenance hemodialysis (MHD) (**Gutiérrez-Peredo, et al., 2020**).

Patient educational guideline is associated with better patient outcomes and supported by international guidelines and organizations that give basic resources for patient knowledge about renal diseases but many barriers remain in progress preventing comprehensive education of patients with progressive renal disease to improve their knowledge about management and treatment alternatives of illness (**Yang, et al., 2020**). Patient education and decision support can be strengthened, with particular attention to low educational literacy, which is common among dialysis patients (**Wyld, et al., 2021**). Diet instruction and nutrition education are recommended for the prevention and management of CKD and ESRD (**Fujii, Kono, & Nishi, 2019**).

Significance of the study:

In Egypt the prevalence of ESRD varies from one governorate to another. **El-Ballat et al., (2019)** reported that in the El-Beheira governorate the prevalence of ESRD patients on regular hemodialysis was 571 per million populations (pmp) (0.057%). **Liao, et al., (2020)** reported that in Menoufia governorate the prevalence was 483 patients per million populations. **Lee et al., (2021)** reported that in Assuit governorate it was 366 pmp and **Tham et al., (2020)** reported that in Beheira the

prevalence of ESRD patients on regular HD in the governmental HD units was 390 pmp. Also **Inker et al., (2019)** reported that the prevalence rate of ESRD in Menoufia Governorate was 330 patients per million populations (pmp). Finally, in Sharqia the prevalence of ESRD patients undergoing hemodialysis was 442 per million populations (0.0442%) in 2017 (**Ahmed, Zahran & Issawi, 2020**).

Patients undergoing hemodialysis encounter many problems based on the blood flow rate and solutes removal rate including hypotension, nausea, vomiting, muscle spasm, headache, and chest pain. Hemodialysis leads to life style changes for families and patients, and the time required for hemodialysis reduce the time accessible for social activities (**Um-e-Kalsoom, Khan & Ahmad, 2020**). Therefore, it is essential to implement educational guidelines to support these patients in achieving improved laboratory and clinical outcomes, independently performing activities of daily living and complying with educational guidelines. In order to provide essential care to patients undergoing hemodialysis, current study was established to assist those patients to improve their knowledge, practice reflected then on improvement of dependency level (**Viecelli et al., 2020**).

Aim of the study:

This study was aimed to evaluate the effect of educational guidelines on knowledge, health care practices, and dependency level for patients undergoing hemodialysis.

Objectives:

1. Assess knowledge, health care practices and dependency level for patients undergoing hemodialysis.
2. Design and apply educational guidelines based on patients' assessment.

3. Evaluate the effect of educational guidelines on knowledge, practice and dependency level for patients undergoing hemodialysis.

Research Hypotheses:

H1: Patients' knowledge will improve post educational guidelines.

H2: Patients' health care practices will improve post educational guidelines.

H3: Patients' Dependency level will decrease post educational guidelines.

Subjects and Methods:

Research design

A pre/posttest quasi experimental research design was used in this study.

A quasi-experimental design is a useful tool in situations where real experiments cannot be used for ethical or practical reasons because it uses a non-random method to assign subjects to groups (**Thomas, 2020**).

Setting:

The study was established in hemodialysis unit of internal hospital at Zagazig University Hospitals. Hemodialysis unit was in the first floor of internal hospital. The unit consisted of six rooms; one room for emergency cases with three beds, two rooms for medical and nursing staff, and three rooms for hemodialysis (10 beds and 10 hemodialysis machine for each room).

Subjects:

A purposive sample of 60 ESRD patients who had already been on hemodialysis at the hospital, from both sexes and aged 20-≥ 60 years, and in different social status, 60 days after treatment start.

Tools for data collection

Tool I- An interviewing questionnaire for patients:

It was designed by the researchers based on literature review (Al-Mawsheki, Ibrahim, & Taha, 2016), and developed in a simple clear Arabic language for the accurate assessment of ESRD patients undergoing hemodialysis. It included the following three parts:

Part 1: Demographic characteristics for patients: It was composed of 12 closed-ended questions covered patients' demographic data such as age, sex, marital status, educational level, occupation, and income.

Part 2: Medical history of patients with ESRD: it included past history, present history, Laboratory investigations and physical examinations, and comorbidities conditions, As well as Measurements of weight and blood pressure.

Part 3: Patients' knowledge regarding ESRD: It consisted of eight close-ended questions on ESRD definition, causes, signs and symptoms, risk factors, diagnosis, complications, treatment, and prevention. In addition to, four close-ended questions about dialysis machine, 14 close-ended questions about nutritional, fluid and electrolyte needs, and three close-ended questions about medications of ESRD.

Scoring system for the patients' knowledge divided into two categories: Correct answers scored as one, and zero for incorrect answers which represent: Satisfactory knowledge more than or equal 75%, and Unsatisfactory knowledge less than 75%. Total knowledge was calculated and summarized by chi-square test and p-values.

Tool II- Patients' health care practices: to assess patient's action toward health problems. It consisted of eight close-ended questions on actions to be taken for gastrointestinal, musculoskeletal,

cardiovascular, respiratory, integumentary, neurological, and dialysis problem. It was developed in accordance to (Manandhar, et al., 2017).

Scoring system for patients' health care practices; shown as one for correct answers, and zero for incorrect answer which represent: satisfactory health care practices $\geq 60\%$ and unsatisfactory health care practices $< 60\%$.

Tool III- Dependency level assessment questionnaire:

It was adapted from Pecoits-Filho et al., (2020), then modified and translated to Arabic to assess patient's level of dependency. It consisted of the following two parts:

Part 1: Activities of daily living (ADLs), it was composed of 11 close-ended questions: covered the following items; dressing, cleaning mouth, showering, toilet hygiene, personal care, nutrition, medical routine, keeping health, socialization, functional and community mobility.

Part 2: Instrumental activities of daily living (IADLs), it was composed of four close-ended questions; each one had different numbers of sub items. It covered the following; home management (dressing, cleaning, meal preparation, shopping, managing money, maintaining the household, & safety procedures), taking care of others, educational activities, vocational activities (vocational exploration, finding a job, planning retirement, & voluntary participation).

Scoring system: (0, 1, 2) for each point, as the following: 2 independent, 1 needing assistance, and 0 dependent. The total score as follows: Activities of daily living score (0-22); 0 - 10 = Dependent, 11 - 16 = independent with assistance. 17 - 22 = Independent. Instrumental activities of daily living score (0-26); 0 - 12 = Dependent, 13 - 19 = independent with assistance, and 20 - 26 = Independent.

Content validity and reliability:

Once the data collection tools were prepared, the content validity was assessed by a panel of five Medical Surgical Nursing experts who reviewed the tools for clarity, relevance, applicability, completeness, and ease of implementation. The agreement percentage was between 80-100%. Minor modifications were made. It was found that Cronbach's alpha reliability coefficient was "0.97, 0.90, and 0.89" respectively for "interviewing questionnaire, patients' health care practices, and Dependency level assessment questionnaire.

Educational guidelines: It was developed and designed by researcher as a booklet in Arabic Language based on a recent review of relevant literature (Canaud, et al., 2019) and expertise opinions.

Educational guidelines (booklet): It included two parts;

Theoretical part which covered through four session about End Stage Renal Disease (ESRD); definition, causes, symptoms, risk factors, diagnosis, complications, treatment, and prevention of ESRD. In addition to, function of dialysis machine, pre dialysis preparation, and problems of dialysis. Also, it contained nutritional needs, balanced high protein foods, and electrolyte needs, precautions during medication taking and its side effects.

Practical part which covered through eight sessions about health care practices about patients' action regarding many health problems; as gastrointestinal problems such as dry mouth, decreased appetite, nausea and vomiting, musculoskeletal problems as muscle cramps, swelling in legs, bone or joint pain, cardiovascular problems as hypertension and hypotension, respiratory problems as shortness of breathing, integumentary system as dry skin or

itching, neurological problems as headache, numbness or tingling in feet. Moreover; adequate practice regarding dialysis problems such as pre dialysis preparation at home, problems during and after dialysis session, vascular access problems, and infection.

Field Work:

The study was conducted from beginning of August, 2022 to the end of January, 2023. Data were collected daily during the morning and afternoon shift.

Assessment phase:

The related materials and literature was examined by researcher broadly. Assessment of patient's knowledge, practice, and dependency level were performed. Educational guidelines were designed based on detected needs, requirements and deficiencies. In addition, teaching materials were prepared. Data collected throughout two phase of assessment. The first phase of assessment was collected prior to implementing educational guidelines to have base line on patient's status. The second phase was done after the educational guidelines. This phase covered a period of one month.

Planning Phase

The development of the educational guidelines was based on analysis of the collected data. It was developed based on guidance from a recent review of relevant literature.

Implementation phase:

Data collected from hemodialysis unit of the internal hospital at Zagazig University Hospitals, Egypt. The educational guidelines covered by 12 sessions in which the examined patients were divided into small groups. Each group contained 5-6 patients. Each session took 30-45 minutes. Researchers provided a full description of the disease, then displayed pictures and videos about proper practice regarding most common

health problems, patients are provided with simplified booklets in Arabic language as guidance. This phase covered through 4 months beginning of September 2022 to end of December 2022.

Evaluation phase

Finally, each patient was evaluated by using the same data collection tools to assess the effect of educational guidelines on knowledge, health care practices and dependency level. This phase covered a period of one month (January 2023).

Pilot study:

It was carried out on six patients (10% of study sample) to test tools of data collection for clarity, relevance, completeness, understandability, feasibility, applicability and ease of implementation. The results obtained helped in modifying the tools. Patients who shared in the pilot study were excluded from the study sample.

Administrative design:

Formal approval was obtained from the research ethics committee of the Faculty of Nursing and the director of Zagazig University Hospital prior conducting the study. In addition to verbal informed consents was obtained from patients participating after its purpose was explained. Patients were given the opportunity to withdraw from participation and were assured that the information would be only used for research purposes.

Ethical consideration:

Research approval was obtained prior educational guidelines, the purpose of the study was explained to patients under

study, researcher confirmed the confidentiality of data, and participants had the right for withdrawing from the study at any time.

Statistical analysis:

Collected data were coded, calculated and statistically analyzed using SPSS, version 22. Qualitative data were presented as frequency and percentages using Chi square (χ^2) for comparison of variables and Fisher Exact Test (FET). Quantitative data were presented as mean \pm SD and Paired t test. Difference was considered significant at $P \leq 0.05$.

Limitation of the study:

- Two subjects were dropped from the study during post program; they died.
- As the general health of the patients were critical, the researcher needed to give the program to each patient separate while he staying at his bed and giving the program in different sessions, that made the researcher need a lot of time and frequent meeting to complete the study.

Results:

Table 1: clears that 55% of studied patients were males with mean age 43.53 ± 9.65 . Also, 75.0% of studied patients were married and 30% were illiterate. Unemployment and housewife represented 61.7%. In addition to, and 73.3% of studied patients had not enough income.

Table 2: clarifies that 30% of studied patients were hypertensive, 25% were diabetic, 11.7% had glomerulonephritis, 12.5%, had unknown and only 8.3% had polycystic kidney. Regarding patients' present history; 40%, 50.0%, 55.0%, 51.7%, 50.0% of studied patients had trouble on staying sleep, dry mouth, nausea,

itching, muscle cramps, respectively. Meanwhile, 48.3% of studied patients had dry skin, and anxiety (worrying).

Table 3: reveals that mean serum albumin level was 4.0 ± 0.5 g/dl, mean hemoglobin concentration 10 ± 2.3 mg/dl, and hematocrit was 32.9 ± 2.3 . Also the same table reveals that the mean of systolic blood pressure was 145.9 ± 23.09 ; diastolic blood pressure, 98.13 ± 15.16 ; and mean weight, 74.77 ± 11.59 .

Table 4: displays that hypertension was the most comorbidity of studied patients with 86.7%, followed by diabetes mellitus, and cardiac disease atherosclerotic 51.7% respectively

Table (5) shows that a highly statistical significant improvement in satisfactory patients' knowledge was found post educational guidelines regarding ESRD causes, risk factors, symptoms, diagnosis, complications, treatment, and prevention ($p < 0.01$). Concerning dialysis machine, there were a highly statistically significant differences between pre and posttest related to problems of dialysis and pre dialysis preparation. Similarly, there was a highly statistical significant

improvement in satisfactory patients' knowledge post-test than pre-test about all items of nutritional needs, and medications ($p < 0.0001$).

Table 6: refers to there was a highly statistically significant improvement in patient's health care practices post educational guidelines regarding actions in case of dry mouth and decreased appetite, and vomiting. There was a highly significant improvement in posttest than pretest for patient's health care practices regarding hypotension, numbness or tingling in feet, problem pre, during dialysis session, vascular access problems and taking medication as doctor orders.

Table 7: reveals that 50% of studied patients were independent with assistant in performing ADLs pre educational guidelines with statistical significant difference. Concerning IADLs, only one fifth of patients (20%) were dependent in performing IADLs pre educational guidelines, Meanwhile, after the educational guidelines they were slightly decreased to 15%.

Table 1: Demographic characteristics of studied patients with ESRD (n=60)

Demographic characteristics	No.	%
Sex		
Male	33	55.0
Female	27	45.0
Age:		
Mean± SD	43.53±9.65	
Range per years	20-60	
Marital status:		
Married	45	75.0
Un married	15	25.0
Education level:		
Illiterate	18	30.0
Read and write/basic-education	11	18.3
Secondary/technical	15	25.0
University	16	26.7
Occupation:		
Employee	18	30.0
Worker	5	8.3
Unemployed or housewife	37	61.7

Income/month		
Enough	16	26.7
Not enough	44	73.3
Treatment characteristics:		
Number of hospitalizations (range)		1.5±1.9 (0-9)
Hospital days (range)		12.2±21.2 (0-124)
Months on dialysis		29.8±44
Prescribed dialysis time		212±24

Table 2: Past and Present Medical history of studied patients with ESRD (n=60)

Medical History	No.	%
Past medical history (Primary cause of ESRD)		
Diabetes mellitus	15	25.0
Hypertension	18	30.0
Glomerulonephritis	7	11.7
Polycystic kidney disease	5	8.3
Other causes as Urinary tract obstruction	15	25.0
Present medical history		
Neurological system	18	30.0
Numbness or tingling in feet	34	56.7
Trouble on staying sleep	24	40.0
Dizziness	16	26.7
Headache	17	28.3
Feeling tired	48	80.0
Circulatory system		
Ischemic heart disease	17	28.3
Chest pain	24	40.0
Gastrointestinal system		
Dry mouth	30	50.0
Decreased appetite	18	30.0
Nausea	33	55.0
Vomiting	8	13.3
Constipation or diarrhea	17	28.3
Genitourinary system		
Difficulty becoming sexually aroused	28	46.7
Integumentary system		
Dry skin	29	48.3
Itching	31	51.7
Musculoskeletal system		
Muscle cramps	30	50.0
Bone or joint pain	20	33.3
Swelling in legs	15	25.0
Respiratory system		
Cough	18	30.0
Shortness of breath	14	23.3
Psychological state		
Worrying	29	48.3
Feeling irritable	22	36.7
Feeling nervous	18	30.0

Table 3: Laboratory investigations and physical examinations of studied patients with ESRD (n=60)

Laboratory investigations	Mean ± SD
Glomero-filtration rate GFR (ml/min per 1.73 m2)	33.4 ± 23.7
Serum albumin (g/dl)	4.0 ± 0.5
Hemoglobin concentration (mg/dl)	10 ± 2.3
Serum creatinine (mg/dl)	2.8 ± 1.9

Phosphate (mg/dl)	5.1 ± 1.6
Calcium (mg/dl)	8.8 ± 0.6
Parathyroid hormone (pg/ml)	229 ± 199
Dialysis urea	1.5±0.3
Hematocrit	32.9±2.3
Physical examinations	
Systolic blood pressure	145.9±23.09
Diastolic blood pressure	98.13±15.16
Weight	74.77±11.59

Table 4: Co-morbidities conditions of studied patients with ESRD (n=60)

Co-morbidities	No	%
Diabetes	31	51.7
Hypertension	52	86.7
Cardiac disease atherosclerotic	31	51.7
Cerebro-vascular disease	9	15.0
Liver disease	8	13.3
Myocardial infarction	4	7.7
Peptic ulcer disease	2	3.3
Heart failure	13	21.7
Peripheral vascular disease	9	15.0
Stroke	7	11.7
Hepatitis C	7	11.7
Pulmonary disease	4	7.7

Table 5: Patients' Satisfactory Knowledge pre/post test (n=60)

Satisfactory knowledge	Pre test		Post test		Comparison	
	No.	%	No.	%	X ²	P
Definition of ESRD	19	31.7	21	35.0	0.300	0.854
Causes of ESRD	11	18.3	42	70.0	64.951	0.0001
Signs & Symptoms of ESRD	29	41.7	48	80.0	26.167	0.0001
Risk factors of ESRD	19	31.7	41	68.3	32.267	0.0001
Diagnosis of ESRD	14	23.3	34	56.6	27.778	0.0001
Complications of ESRD	24	40.0	44	73.3	27.149	0.0001
Treatment of ESRD	41	68.3	50	83.3	7.366	0.0007
Prevention of ESRD	28	46.7	38	63.3	6.734	0.0009
X ² = 24.089						
Dialysis Machine (DM):						
Function of DM	53	88.3	55	91.7	0.791	0.389
Dialysis / weak	60	100.0	60	100.0	-	-
Problems of dialysis	35	58.3	51	85.0	21.012	0.0001
Pre-dialysis preparation	29	48.3	48	80.0	26.167	0.0001
X ² = 11.992						
Nutritional needs:						
Limit fluids	39	65.0	57	95.0	33.750	0.0001
Balanced high-protein foods	30	50.0	54	90.0	45.714	0.0001
Control potassium	22	36.7	42	70.0	26.786	0.001
Avoid salt	31	60.0	59	98.3	53.457	0.0001
X ² = 39.926						
Medications:						
Recognize medications taken in ESRD	22	36.7	40	66.7	21.624	0.0001
Precautions during medications taking	18	30.0	42	70.0	28.400	0.0001
Precautions of medication side effects	20	33.3	29	48.3	5.588	0.018
X ² = 18.537						

Total knowledge scores		X ² =23.636		P= 0.044		
X ² Chi-square test		P ≤ 0.05 (significant)				
Table 6: Patient's Satisfactory Health Care Practices Regarding System Problems pre/post test (n=60)						
Satisfactory health care Practices regarding	Pre test		Post test		Comparison	
	No.	%	No.	%	X ² .	p
Gastrointestinal system problems						
Dry mouth	31	51.7	42	70.0	8.464	0.0004
Decreased appetite	21	35.0	39	65.0	21.600	0.0001
Vomiting	19	31.7	30	50.0	8.347	0.0004
Nausea	17	28.3	27	45.0	7.177	0.0007
X ² = 11.397		P= 0.003				
Musculoskeletal system problems						
Muscle cramps	27	45.0	42	70.0	6.696	0.010
Swelling in legs	22	36.7	28	46.7	2.469	0.116
Bone or joint pain	27	45.0	34	56.7	3.268	0.071
X ² = 4.149		P= 0.107				
Cardiovascular system problems						
Hypertension	29	48.3	39	65.0	6.787	0.0009
Hypotension	34	56.7	46	76.7	13.426	0.0001
X ² = 10.106		P= 0.004				
Respiratory system problems						
Shortness of breath	21	35.0	30	50.0	2.500	0.114
Integumentary system problems						
Dry skin or Itching	26	43.3	30	50.0	1.071	0.301
Neurological system problems						
Headache	34	56.7	40	66.7	2.538	0.111
Numbness or tingling in feet	17	28.3	29	48.3	10.153	0.0001
X ² = 6.345		P= 0.056				
Dialysis problems						
Pre dialysis preparation at home	21	35.0	48	80.0	49.719	0.0001
Problems during dialysis session	37	61.7	49	81.7	11.819	0.0001
Problems after dialysis session	33	55.0	41	68.3	4.512	0.034
Vascular access problems	21	35.0	44	73.3	35.513	0.0001
Infection	33	55.0	41	68.3	4.512	0.034
X ² = 21.215		P= 0.0136				
Medication						
As doctor order	27	45.0	43	71.7	17.554	0.0001
From your experience	33	55.0	17	28.3	17.554	0.0001
X ² = 17.554		P=0.037				
Total practice		X ² =21.636		P= 0.024		
X ² Chi-square test		P ≤ 0.05 (significant)				

Table 7: Daily living Activities for studied Patients pre and posttest (n=60)

Items	Pre test		Post test		Comparison	
	No.	%	No.	%	X ²	P
Activities of daily living						
Independent (12-20)	30	50.0	38	63.3	0.037	4.344
Independent with assistant (8<12)	25	41.7	19	31.7	0.108	2.584
Dependent (0<8)	5	8.3	3	5.0	0.301	1.071
X ² = 2.666		P= 0.1486				
Instrumental activities of daily living						
Independent (10-16)	33	55.0	35	58.3	0.602	0.271
Independent with assistant (6<10)	15	25.0	16	26.7	0.768	0.087
Dependent (0<6)	12	20.0	9	15.0	0.308	1.039
X ² = 0.465		P= 0.559				
X ² Chi-square test		P ≤ 0.05 (significant)				

Discussion:

Concerning demographic characteristics of studied patients; the study findings showed that more than half of studied patients were males with mean age 43.53 ± 9.65 . Also, three quarters of them were married and more than one quarter of them were illiterates. In addition to about two third of studied patients were not employers and housewives while, nearly three quarters of studied patients had not enough income and only 13.3% of them were smokers.

This study finding was in consistent with, **El-Ballat et al., (2019)**, who illustrated that more than half of patients were males with mean of age 52.80 ± 13.82 . Similarly with, **Ahmed, Zahran & Issawi, (2020)** who added that 54.8% of patients were male; 88.6% of the studied ESRD patients were married; 37.1% are uneducated. In agreement with (**Abd El Aziz & Abd El khalek, 2019**) who revealed that above half (56.9%) of study subjects were males, two thirds (62.5%) without job and more than two thirds (70.6%) undergoing hemodialysis for more than 24 months, meanwhile (5.6%) undergoing hemodialysis for less than 6 months.

Concerning treatment characteristics, the mean of ESRD patient hospitalizations was 1.5 ± 1.9 (0–9), and months on dialysis were 29.8 ± 44 . In the same line with **Marrufo et al., (2019)** and **Centers for Medicare & Medicaid Services, (2020)** who mentioned that the number of hospitalizations was reduced from 1.82 to 1.58 between 2009 and 2018. Meanwhile, the lowest rate (1.55) occurred in 2015.

Regarding past medical history, one third of studied patients were hypertensive, one quarter were diabetic, 11.7% had glomerulonephritis, 12.5% had unknown or other causes and only 8.3% had polycystic kidney. This may be due to the high prevalence of diabetes and hypertension among males. Also,

those patients have lack of knowledge regarding to their disease complications that lead to damage of kidneys and reach ESRD. This finding was in consistent with **Crew, Bello, & Saadi (2019)** who mentioned that, 31.8% were hypertensive, 15.5% were diabetic mellitus, 8.8% urinary tract infection, 8.4% kidney stone, 4.6% congenital abnormality and 3.7% had primary glomerulonephritis. In contrast to the previous findings, **Stumm et al., (2021)**, found that the highest percentages were Systemic Arterial Hypertension followed by undetermined cause and Diabetes Mellitus.

Concerning patients' present history; more than half of patients had trouble on staying sleep, nausea, itching, while half of them had dry mouth, muscle cramps,. Meanwhile, about half of them had dry skin, and anxiety (worrying). Similarly with **Hreńczuk, Koziel, Malkowski, (2019)** who added that the most common treatment related symptoms presented by patients were: general weakness, blood pressure fluctuations, muscle cramps, headaches, itchy skin, mental fatigue and insomnia. The relatively high prevalence of depression and anxiety in CKD patients is a major concern of **Abo El- Ata, et al., (2021)**.

The study findings illustrated that, mean serum albumin level was 4.0 ± 0.5 g/dl, mean Hemoglobin concentration 10 ± 2.3 mg/dl, and hematocrit was 32.9 ± 2.3 . Also the mean weight, 74.77 ± 11.59 . These findings were in consistent with **Kalantar-Zadeh et al., (2021)**, who found that, hypoalbuminemia is a well-established in chronic kidney disease (CKD). The progression of Chronic Kidney Diseases to renal failure and the initiation of hemodialysis predispose an already at-risk population toward hypoalbuminemia with approximately 60% of HD patients have albumin level < 4.0 g/dl.

Regarding to systolic blood pressure among the study sample, the mean range was 145.9 ± 23.09 , while the mean range of diastolic blood pressure was 98.13 ± 15.16 . The elevation in the blood pressure can damage the nephrons leading to loss their ability to filter waste from the blood. In this respect **Dan Pugh, Gallacher & Dhaun, (2019)** stated that hypertension is the cause and effect of CKD which affects the majority of CKD patients. Hypertension is commonly accompanied by CKD and an important risk factor for cardiovascular diseases and CKD progression (**Hafez et al., 2019; Roehm & Weiner, 2019**).

The study finding displayed that hypertension was the most comorbidity among studied patients, followed by diabetes mellitus, and cardiac disease atherosclerotic, respectively. This may be due to that diabetes mellitus had moved from a contraindication for hemodialysis to a primary cause of ESRD. As well as congestive heart failure, hypertension, anemia, peripheral vascular disease, depression, and cerebrovascular diseases. This study finding was similar to that reported by **White, (2020)** and **Lan Li et al., (2021)**, who showed that the most patients had one or more of the following comorbidities: diabetes mellitus, hypertension, congestive heart failure, ischemic heart disease, cerebrovascular accident, and gout.

The current study findings clarified that there was a highly statistical significant improvement in satisfactory patients' knowledge post educational guidelines regarding ESRD, as causes, risk factors, symptoms, diagnosis, complications, treatment, and prevention ($p < 0.01$). Concerning dialysis machine, there were a highly statistical significant differences between pretest and posttest regarding dialysis problems and pre dialysis preparation. Similarly, there was a highly statistical significant improvement in satisfactory patients'

knowledge post-test than pre-test about nutritional needs, and medications ($p < 0.0001$).

This could be due to that the ESRD patients gained knowledge and experience from long term care which supported by a well effective educational guideline that encouraged the patients to attend all sessions and take medicines just the way doctors prescribed to them. In the Egyptian society, most people take over the counter medications, vitamins, or herbs that can damage the kidneys and cause ESRD.

In accordance with **Fadlalmola & Elkareem, (2020)**, who found that the implementation of intervention had a positive impact on overall patients' knowledge regarding definition of hemodialysis, care of vascular access, complication, dietary and fluid restrictions, medications and activities that help patients to adapt the disease. There was a significant improvement in all mean knowledge from 48.6% in pretest to 86.3% in posttest. This finding was supported by **Alikari et al., (2019)** who reported that intervention program can improve knowledge, compliance and Quality of Life for hemodialysis patients.

The results of the current study indicated that there was a highly statistical significant improvement in patient's practice post educational guidelines regarding actions taken in case of dry mouth and decreased appetite, and vomiting. Moreover, there was a highly statistical significant improvement in posttest than pretest for patient's practice regarding hypotension, numbness or tingling in feet, problem pre, during dialysis session, vascular access problems and taking medication as doctor orders.

This finding may be due to that patient education is associated with improved patient outcomes and supported by international guidelines which provide important resources for patient information about kidney

disease. Individual discipline has proven educational intervention to be effective among dialysis patients to improve quality of life, self-care management practice, knowledge, biochemical parameters and therapeutic adherence (Yang et al., 2020).

The current study finding revealed that half of patients under the study were independent with assistant in performing daily living activities before educational guidelines with a statistical significant difference between pre and post educational guidelines. As regards instrumental activities of daily living, there were only one fifth of studied patients were dependent in performing instrumental activities of daily living pre educational guidelines, Meanwhile, they slightly decreased post educational guidelines.

Improvement in patient's independency level might be due to disease process, treatment effectiveness, care provided for ESRD patients, and furthermore could be attributed to the impact of the educational guideline. Moreover, the need for hemodialysis leads to many changes in life style of all patients as a result of three day / weak the patient goes to the hemodialysis unit by socioeconomic burden, physical and psychological stress.

This finding was supported by Vijay& Kang, (2019) who illustrated that nursing educational is a basic process that help patients to make choices and lifestyle changes through using problem solving, setting goal and feedback. It emphasizes patients' role and responsibility in managing their disease.

Conclusion:

It can be concluded that, development of educational guidelines showed a significant improvement in patients' knowledge, health care practices,

together with modifying the dependency level.

Recommendations:

- Carry out different related educational guidelines and counseling sessions for patients with ESRD regarding proper intervention, healthy lifestyle, and coping strategies.
- Screening of patients with chronic disease such as hypertension, diabetes mellitus for early detection and prompt treatment for their complications especially any changes occurs in renal system that end by ESRD.
- Health educational program should be directed towards improving nurses' knowledge and practice especially, those who are caring for patients undergoing hemodialysis.

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The first author contributed to data collection, provided pre and posttest, applied educational guidelines to patients, preparation of videos and colored booklet, collection of references, and data analysis. The second author contributed to the conception of the research, development of tools, statistical analysis, comments on the tables, the translation of the tools and booklet into Arabic, participation in the references and data collection, and administration of educational guidelines. The third author

contributed to tools development, statistical analysis, participated in applying educational guidelines.

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