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Effect of Designed Nursing Intervention Protocol on Postoperative Arteriovenous Fistula Complications and Maturation among Patients with End Stage Renal Disease

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Abstract: **the current study was carried out to evaluate the effect of designed nursing intervention protocol on post arteriovenous fistula complications and maturation; Design: quasi experimental design. Setting: The study was carried out at vascular outpatient's clinic, vascular unit of general surgery department and hemodialysis unit, Menoufia university hospitals, subjects: purposive sample of 100 patients with end stage renal disease included in the study. Tools :(I) Arteriovenous Fistula Patients Needs Assessment: comprised of three parts: 1) Socio-Demographic and medical data, 2) Arteriovenous Fistula Knowledge Assessment Sheet, 3) questionnaire sheet about patient's Compliance to self-care practices. Tool II: Observational checklist sheet that consisted of two parts, part one: concerning to dressing change, hand compression exercise, and thrill palpation. Part two: observing complications. Results: the mean knowledge scores about arteriovenous fistula among study group had significantly increased than control group. The mean practice scores among study group was higher than control group. Study group had significantly improved compliance to self- care practices than control group. study group had lower incidence of complications than control group as well time for fistula maturation was shorter among study group than control group. Conclusion: a designed nursing intervention protocol have a positive effect in reduction and prevention of complications as well acceleration of maturation. Recommendations: application of designed nursing intervention protocol as a routine hospital care is important**

Keywords: **arteriovenous fistula, designed nursing intervention protocol `, end stage renal disease, postoperative fistula complications and maturation.**

I. INTRODUCTION

End-stage renal disease (ESRD) is a significant epidemic and public health problem has a major health impact worldwide. As the over-all number of (ESRD) patients needing renal replacement therapy has been growing dramatically. It is estimated that the prevalence rate of ESRD will increase over the following several decades, attributed to increasing prevalence of diabetes, hypertension, and increasing life expectancy [1,2,3]

Hemodialysis (HD) is the therapy used often among patients with ESRD and is the basic renal replacement therapy. It was assessed that, in 2010, the number of people getting renal replacement therapy worldwide was 2618 million, with 78% of them on dialysis. By 2030, this figure will more than double to 5439 million in Asia and Africa (4,5)

In Egypt, the prevalence of ESRD is about 74 per million every year, and around 264 patients on dialysis for each million populations. Although hemodialysis may improve quality of life and increase life expectancy but it influenced by quality of care delivered to patients by dialysis facilities (6,7)

An effective hemodialysis treatment is dependent on a well-functioning vascular access which has good blood flow, excellent patency, and allow easy and repetitive cannulation with two needles. (AVF) is the top access for permanency and lowest morbidity and mortality rate, followed by arteriovenous grafts (8).

Though the arteriovenous fistula (AVF) is the top access for dialysis, the fistula is liable to various complications such as: blood hypo flow, thrombosis, stenosis, bleeding, hematoma, infection, hand ischemia, hand edema and cardiac overload. The reduction or prevention of these complications can be carried out through the use of fitting care. In this route, the responsibility for the actions belong to the health care team and to the end stage renal patient, which must be instructed in self-care about newly created vascular access (9,10,11,12).

So adequate knowledge of all these potential complications make preventive measures necessary for ESRD patients as it will form a positive behavior that lead to the good self-care practice concerning (AVF). Failure to follow these safety measures may lead to hospitalization (13,14)

The time taken for maturation of a new arteriovenous fistula is ranged from four to six weeks which should be properly informed to the patients and relatives. Furthermore, the patients, whose arteriovenous fistula fails to mature adequately to be used for dialysis, require subsequent interventions to promote fistula maturation. Otherwise there will be poor blood flow, frequent thrombosis and malfunction (15)

The nursing staff play an important role in caring the patient with arteriovenous fistula before and after operation (16). In addition the patient must be directed by nursing staff to implement some care with the arteriovenous fistula , among which include: perform daily exercise with squeezing rubber ball by hand for fifteen minutes three times a day helps keep the fistula; performing dressing and observe any change in the location of the fistula, as heat, pain, erythema, and swelling, palpation of the thrill (vibration noticeable due to arterial blood mix with deoxygenated blood), any abnormality should be reported to medical and nursing teams; avoid any actions that subject fistula to dysfunction such as venous puncture ,check blood pressure in the arm of the fistula; , sleeping on the arm of fistula and any pressure, should not remove or allow removal of hair and scabs formed in the region of the fistula (17).

Appropriate and active education regarding the care of (AVF) at home is very important. to prevent the complications of arteriovenous fistula, there is a list of cues that the patients should follow strictly. Never touch the access for any purpose without strict hand washing, never carry heavy loads across or on the fistula, never sleep on the fistula, continually keep the access clean. Furthermore, these guidelines provide information like how to observe the signs of complications (18).

1.1 SIGNIFICANCE:

It is very needed to take care of the vascular access to prevent complications and accelerate maturation. Patients with End-stage renal disease are susceptible to develop complications related to their arteriovenous fistula such as infection, clotting, rupture, pseudo aneurism formation, bleeding and stenosis. Moreover, the researcher thought that post-operative care of arteriovenous fistula is very important nowadays that there is increase in number of complications due to inadequate knowledge of patients and their care givers regarding care of arteriovenous fistula. They need guidance on prevention of these complications and accelerate maturation. It's crucial since most early arteriovenous fistula dysfunction cane be rescured and sparing the patient frustration of having to go through the creation of another access and the placement of central venous line So the researcher felt a need to evaluate the effect of a designed nursing intervention protocol on post-operative arteriovenous fistula complications and maturation among patients with end stage renal disease

1.2 AIM OF THE STUDY:

The current study aims to evaluate the effect of designed nursing intervention protocol on post- operative arteriovenous fistula complications and maturation among patients with end stage renal disease.

1.3 RESEARCH HYPOTHESIS:

The following research hypotheses were formulated in an attempt to fulfill the aim of the current study:

- The mean knowledge scores about arteriovenous fistula among study group subjects will be higher than control group subjects post application of a designed nursing intervention protocol

- The mean practice scores of study group subjects will be higher than those among control group subjects post application of designed nursing intervention protocol
- Study group subjects will show better compliance to self-care practices post application of designed nursing intervention protocol as compared to control group subjects
- Incidence of post arteriovenous fistula complications will be lesser among study group than control group subjects post application of designed nursing intervention protocol
- Time taken for arteriovenous fistula maturation will be shorter among study group subjects as compared to control group subjects post application of designed nursing intervention protocol

II. METHODS

2.1 Research Design: quasi experimental research design was applied to achieve the aim of the current study.

2.2 Setting: The current study was conducted at vascular outpatient's clinics, the vascular unit of general surgical department, and hemodialysis units of Menoufia University Hospital, Menoufia Governorate - Egypt.

2.3 Sample: A purposive sample including 100 patients who admitted to vascular outpatient's clinic for undergoing arteriovenous fistula who agreed to participate in the study and fulfill the inclusion criteria. The study subjects were divided randomly and alternatively into two equal groups 50 patients in each as follow:

- The study group (I): received routine hospital care beside application of a designed nursing intervention protocol provided by researcher (as knowledge about AVF, essential care during maturation, instructions about self-care practices that must be complied to prevent AVF failure in additional to continuous observation for early detection and prevention of AVF complications through the period of AVF maturation
- The control group (II): received the routine hospital care only.

2.3.1 ***Inclusion criteria***: Adult subjects of both sexes (male and female). Patients undergoing procedures for the first time, age from 18- 60 years

2.3.2 ***Exclusion criteria:*** All patients with mental disabilities, and/or who unable to understand the information and instructions were provided by the researcher.

2.3.3 Sample size: Sample size was calculated dependent on the previous year census report number of patients admitted to operating room for the first time to have arteriovenous fistula, Menoufia university hospital, Menoufia governorate, Egypt. Total numbers of end stage renal disease patients were nearly 155 patients. Sample size was calculated using equation below:

$$n = \frac{N}{1 + N(e)^2}$$

Where; n= sample size; N= total population number (155); e= margin error (0.05).

Atotal 111 of end stage renal disease patients with newly created arteriovenous fistula were included in the present study. 11 patients refused to follow the study so 100 patients were allocated randomly into two groups: study group (50) and control group (50).

2.4 Tools: Two tools were developed and used by the researcher based on reviewing of related literature to accomplish the aim of the current study and to collect the necessary data. These tools were as following:

Tool 1: Arteriovenous Fistula Patients Needs Assessment: Structured Interviewing Scheduled Questionnaire: This tool was developed by the researchers based on the review of the relevant literature. It was used to determine the needed care for arteriovenous fistula patients. The tool involved of the following three parts:

Part 1: Sociodemographic and medical data: It was included of items related to patients' age, sex, marital status, educational level, occupation, residence, smoking, history of chronic disease, date of surgery and date of first use of arteriovenous fistula.

Part II: Arteriovenous Fistula Knowledge Assessment Sheet. It composed of seven questions. It was concerned with items to assess patient's knowledge about arteriovenous Fistula as definition of arteriovenous Fistula, locations of arteriovenous fistula, benefits, time taken for maturation, measures that promote maturation, possible complications post procedure and its prevention / reduction.

Scoring system: Each question has three response categories and for data analysis the respondents answer as following:

- Correct and complete answer was given a score of two.
- Correct and incomplete answer (partially correct answer) was given a score of 1.
- Incorrect answer or didn't know was given a score of 0.

The patient's answers were calculated and recorded, then the total score of the patient's knowledge ranged from zero as a minimum score of 14 as a maximum score and was categorized into: a score of 0

< 7 (< 50%) denoted poor or unsatisfactory results while a score of 7< 11 indicated fair results and a score between 11 and 14 represented good or satisfactory results.

Part III: Questionnaire sheet for patient's compliance to self-care practices: It was developed by the researcher after reviewing the related literature to assess patients' compliance to the prescribed instructions about self-care practices. It included the following items: avoid pressure of any kind on arteriovenous fistula arm, avoid actions that cause injuries or trauma to arteriovenous fistula, follow measures to maintain arteriovenous fistula free from infection, avoid exposure to temperature extremes (very hot or very cold weather), monitoring arteriovenous fistula thrill daily and finally monitoring signs and symptoms that indicate arteriovenous fistula complication daily. It was written in Arabic language

Tool II: Observational checklist sheet: It was developed by the researcher after reviewing the related literature and included two parts as following:

Part one: to observe patients' performance about dressing change, hand compression exercise, thrill palpation. It included three sections:

Section one: Dressing change: it was composed of 7 steps that adapted from BC renal agency (2013).

(19) Total marks fourteen for all steps. Patients were given 2 score if the patient performed each step of the procedure correctly and 1 mark if incorrectly, while zero if he did not perform it.

Section two: Hand compression exercise: It was composed of 4 steps that adapted from BC renal agency (2014) (20). Total marks eight for all steps. Patients were given 2 score if he or she performed each step of the procedure correctly and 1 mark if incorrectly, while zero if he did not perform it.

Section three: Thrill palpation. For thrill palpating, patients were given 2 score if the patient palpate thrill correctly and 1 mark if incorrectly, while zero if he did not perform it.

Part two: observing possible developed complications during the period of study until the arteriovenous fistula mature and ready for dialysis

2.4.1 Validity and reliability of the tools:

Validity and reliability: Tools were tested for content validity by five experts (three experts in the field of Medical Surgical Nursing, Faculty of Nursing, Menoufia University, and two experts in the field of Medicine specialized in Vascular surgery, Faculty of Medicine, Menoufia University then adjustments were done accordingly to ascertain relevance and completeness. All tools were tested for reliability using test retest method to ascertain consistency: patient's knowledge regarding to arteriovenous fistula (r = 0.87), patient's compliance to instruction about self-care practices: ranged from 0.80 to 0.85, observational check list ranged from 0.90 to 95. `

2.5 Pilot Study:

A pilot study: a pilot study was conducted prior to data collection on 10% of the study sample (10 patients) to evaluate the developed tools and designed instructive intervention booklet for clarity and applicability, and then necessary modifications were carried out. The data was obtained from the pilot study wasn't included in the actual study.

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2.6 Ethical Consideration:

After permission to carry out the study the researcher initially introduced herself to the patients who met the inclusion criteria, then explained the aim of the study as well as, they were guaranteed that all collected data from them will be used only for the study's purpose. The researcher highlighted also that the participation in the study is totally voluntary and withdrawal from the study would not affect the care delivered; anonymity and confidentiality were assured through coding the data. Finally, a formal consent was obtained from the patients who were agree to participate in the study.

2.7 Procedure and Data Collection:

A reviewing of past and current literature covering the various aspects of the arteriovenous fistula complications was done using books, articles periodicals, magazines and studies related to nursing intervention on prevention / reduction of post-operative arteriovenous fistula complications **Approval:**

- Written Approval: An official Permission to carry out the current study was obtained by the researcher from the hospital authorities. after an explanation of the aim of our study.

- Data collection process: Data collection was extended from the first February 2018 to the end of July 2018. A purpose sample of 100 patients were divided randomly and alternatively into two equal groups:

- The study group (I): were received a designed nursing intervention protocol through knowledge, practice about dressing change, hand compression exercises and thrill palpation in addition instruction about self-care practices for their arteriovenous fistula care

- The control group (II): were exposed to routine hospital care according to the usual hospital routine and without interference from the researcher.

- The researcher met the subjects for the first time in the vascular outpatient's clinics of Menoufia University Hospital.

- The researcher initiated data collection by using the pre-test Questionnaire, in which the studied groups were interviewed by the researcher using the structured interview. Each patient in both groups (study and control) was interviewed individually to fill the tool one (part one including biososciodemographic data and part two regarding patient's knowledge about arteriovenous fistula definition, fistula sites used for it's established, it's benefits, time taken for maturation, measures that enhance maturation, possible complications and how to prevent such complications in the vascular outpatient's clinic pre- operative.

- In the same day each patient of both groups asked about arteriovenous fistula care that must be carried out during the period of maturation as dressing change, hand compression exercise and thrill palpation and observed for performance of such procedure if he or she know .to obtain data related to need assessment in order to provide a designed nursing intervention protocol relevant to patient's needs

- Each patient of study group was scheduled for 3 teaching session in 3 days each session lasts about 30-45 minutes for each patient pre-operative.

- First session patients received knowledge supplemented by written material that’s supplemented by pictures as an illustrative guide about definition of arteriovenous fistula, sites used for it's established, it's benefits, time taken for maturation, measures that enhance maturation, possible complications and how to prevent such complications through lecture.

- Second session included demonstration about dressing change, hand compression exercise and thrill palpation by the researcher. Patients are allowed to redemonstration the skill several times until the researcher made sure that it was successfully mastered. using colored pictures and videos to enhance understanding of patients

- Third session: instructions about self-care practices that patient must complied 1. Avoid pressure of any kind on AVF arm for example do not wear a watch, bracelet or tight clothes over AV fistula., do not allow straps or handles tighten around the fistula, do not sleep on AVF, do not take blood pressure from AVF arm, do not let anyone start an IV line or draw blood from AVF arm, avoid Strong bending of your fistula arm, 2. actions that cause injuries of AVF such as Do not

use sharp objects near your fistula arm, for example razors should be avoided. Do not carry heavy weights with AVF arm. it is best to avoid carrying a purse or bag on that arm ,3. Follow measures to maintain AVF free from infection as aseptic technique during dressing change, strict hand washing before thrill palpation. coughing or sneezing in the direction of the fistula should be avoided., and Refrain from scratching the fistula area and particularly the access sites. 4. Avoid exposure to temperature extremes a s excessive heat (e.g. sauna), on a very hot day, try to stay in the shade. Excessive cold. On extremely cold days, remember to wear appropriate warm clothes if you want to get some fresh air outside 5. Check the pulse (thrill) in your AV fistula 3 times daily – morning, afternoon and evening. 6.Look for redness or swelling around fistula area, or any other abnormality and report immediately to available physician or nurse, (pre-operative)

- Each patient in study group was contacted 3 days every week post-operative in the vascular unit, vascular outpatient's clinic follow up, and hemodialysis unit or by telephone to reinforce provided knowledge and practice to respond to their question and try to help them to solve problems that might arise during period of maturation

- Patients in the study and control groups were assessed 2 times during period of fistula maturation pre intervention, and post application of a designed nursing intervention protocol using all tools. Except tool two-part two

- Patients compliance to instructions about self-care practices (in the study and control groups) were assessed two time after three and six weeks post application of a designed nursing intervention protocol

2.8 Statistical analysis:

Data were collected, organized, tabulated and statistically analyzed using an IBMpersonal computer with Statistical Package of Social Science (SPSS) version 19 where the following statistics were applied. a- Descriptive statistics: in which quantitative data were presented in the form of mean($\overline{X}$), standard deviation (SD) and qualitative data were presented in the form numbers (No) and percentages(%).

b- Analytical statistics: The used tests of significance included:

- Independent sample t-test is a test of significance used for comparison between two groups having quantitative variables.

- X^2 is a test of significant used for comparison between two group for qualitative variables Significance was adopted at $p<0.05$ for interpretation of results of tests of significanceas

- P value of > 0.05 was considered statistically non-significant
- P value of < 0.05 was considered statistically significant
- P value of < 0.001 was considered statistically highly significant

III. RESULTS

Table (1) displayed that the mean age of both study and control groups were 44.04± 8.78 and 46.06±

8.48 respectively, and more than half the studied subjects in both groups were males. The majority of the study group and the control group were married. About half of them have preparatory and secondary education. More than one-third not working. The common chronic disease was hypertension; it was found in 40% of study group and 44% of control. Finally, the majority of both group not smokers.

Table (2) It is revealed that the mean knowledge score about arteriovenous fistula were 4.72± 3.94 & 4.42± 4.01 in study and control group respectively pre intervention, while post intervention the mean knowledge score about arteriovenous fistula were 13.02± 2.19 and 5.24±4.02(in study group & control group respectively). In addition, there was statistically significant difference between study and control groups (P=.000)

Table (3) It is revealed that pre application of designed nursing intervention protocol, there were non-significant differences between study and control group regarding mean total and subtotal scores of all patient's practices regarding dressing change, arm & hand exercise and thrill palpation. While post application of designed nursing intervention protocol, there were highly significant differences between both groups related to the previous scores of practice performance. With P value < 0.000

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Table (4) It is showed that there was a high statistical significant among study group subjects than control group regarding to compliance to instruction about self-care practices for arteriovenous fistula maintenance after the third and sixth week of application of designed nursing intervention protocol with P value<0. 000

Table (5) clearly noted that relation to the complications developed during the period of maturation there was significant difference among study group than control group with X^2 = **13. 18**p value was (<0. 022).

Table (6) As seen in this table that time taken for fistula maturation was longer among control group than study group the study group subjects (10%) as compared to (30%) of control group had period of 60 and more than 60 days. The mean time taken for maturation of arteriovenous fistula in days for the two groups were as follows 48.94 ± 8.97, 54.96 ± 9.64 respectively. A high statistically significant difference was put into evidence between the two groups considering maturation period with t = 3.23 p

< 0.002**.**

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

Sociodemographic characteristics	Study group (n=50)		Control group (n=50)		χ^2 test	P value
	No	%	No	%		
Age (years):						
25 - 34	5	10	5	10	.216	.897
35 - 44	12	24	15	30		
≥ 45	33	66	31	62		
Mean ±SD	44.04± 8.78		46.06± 8.48		t. 1.17	.245 NS
Sex:						
Male	28	56	27	54	.040	.841
Female	22	44	23	46		
Marital status:						
Single	4	8	3	6	.489	0.783
Married	40	80	41	82		
Widow/ Divorced	7	14	5	10		
Levels of education:						
Illiterate	9	18	10	20	.519	.915 NS
Read& write	8	16	10	20		
Preparatory	23	46	22	44		
&secondary	10	20	8	16		
University/ Post graduate						
Occupation						
Manual work	5	10	6	12	.441	.932 NS
Administrative work	10	20	12	24		
House wife	15	30	13	26		
Not working	20	40	19	38		
Residence						
Rural	42	84	43	86	.078	.779
Urban	8		7			
Smoking						
Yes	7	14	8	16	.078	.779
No	43	86	42	84		
Chronic disease						
None	16	32	14	28	.229	.973
Hypertension	20	40	22	44		
Diabetes mellitus	8	16	8	16		
Liver disease	6	12	6	12		

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Table (2): Distribution of both study and control groups as regards to patient's knowledge about arteriovenous fistula pre and post application of designed nursing intervention protocol

Group / Variables	Before application of designed nursing intervention protocol				Test of significant χ^2 P value	After application of designed nursing intervention protocol				Test of significant χ^2 P value
	Study N= 50		Control N= 50			Study N= 50		Control N= 50		
	No	%	No	%		No	%	No	%	
Meaning of AVF					.361					38.17
Correct and	9	18	8	16	.835	40	80	10	20	.000
complete Partial	19	38	17	34		8	16	19	38	
answer	22	44	25	50		2	4	21	42	
Incorrect answer or don't know										
Locations of AVF										
Correct and	7	14	8	16	.089	42	84	9	18	46.88
complete Partial	20	40	19	38	.997	8	16	22	44	.000
answer	23	46	23	46		0	0	19	38	
Incorrect answer or don't know										
Benefits of AVF										
Correct and	7	14	6	12	.228	39	78	8	16	
complete Partial	28	56	27	54	.892	10	20	29	58	39.98
answer	15	30	17	34		1	2	13	26	.000
Incorrect answer or don't know										
Time of maturation										
Correct and complete	10	20	7	14	.186	47	94	11	22	53.54
Partial answer	22	44	22	44	.911	3	6	27	54	.000
Incorrect answer or don't know	18	36	21	42		0	0	12	24	
Measures to enhance maturation										
Correct and complete	0	0	0	0	.457	45	90	0	0	82.64
Partial answer	15	30	12	24	.499	5	10	17	34	.000
Incorrect answer or don't know	35	70	38	76		0	0	33	66	
Possible complications										
Correct and complete	3	6	4	8	.682	46	92	6	12	64.59
Partial answer	32	64	28	56	.711	4	8	31	62	.000
Incorrect answer or don't know	15	30	18	36		0	0	13	26	
Measures to prevent complication Correct										
and complet Partial	0	0	0	0	.641	43	86	0	0	83.03
answer	26	52	23	46	.423	7	14	28	56	.000
Incorrect answer or don't know	24	48	27	54		0	0	22	44	
Total score of knowledge (score=14): Mean ±SD	4.72± 3.94		4.42± 4.01			13.02± 2.19		5.24±4.02		
Independent t test P value	.377 .707					11.98 .000				
Total score categories:										
Poor (< 50%) < 7	35	70	38	76	.816	2	4	33	66	54.30
Fair (50-< 80%) = 7-<11	8	16	5	10	.665	4	8	9	18	.000
Good (≥ 80 %) ≥ 11	6	12	7	14		44	88	8	16	

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Table (3): Mean and stander deviation of total and subtotal scores about practice for both study and control groups pre and post application of designed nursing intervention protocol

Group / Patient's practices	Before application of designed nursing intervention protocol		t- test P value	After application of designed nursing intervention protocol		t- test P value
	Study N= 50	Control N= 50		Study N= 50	Control N= 50	
	Mean ±SD	Mean ±SD		Mean ±SD	Mean ±SD	
Dressing of AVF	3.66±3.97	3.58±4.26	.092 .923	12.18±1.40	5.16±1.97	24.58 .000
Hand &arm exercise of AVF	1.34±1.18	1.38±1.27	.162 .871	7.36±.72	3.18±.98	24.73 .000
Thrill palpating of AV	.76±.55	.76±.62	.000 1.000	1.8±.40	.76±.68	9.22 .000
Total score of practices (score=24): Mean ±SD	5.68±5.25	5.72±5.80	.036 .971	21.28±2.35	9.12±2.83	22.62 .000

Table (4): Distribution of both study and control groups as regards to patient's compliance to self-care practices for arteriovenous fistula maintenance (three weeks post intervention, and Six weeks post application of designed nursing intervention protocol)

Complied / Group	three weeks post application of designed nursing intervention protocol				Test of significant χ^2 P value	Six weeks post application of designed nursing intervention protocol				Test of significant χ^2 P value
	Study N= 50		Control N= 50			Study N= 50		Control N= 50		
	No	%	No	%		No	%	No	%	
Avoid pressure of any kind on AVF arm										
Never	0	0	0	0	31.06	0	0	0	0	31.71
Occasionally	3	6	29	58	.000	1	2	26	52	.000
Always	47	94	21	42		49	98	24	48	
Avoid actions that cause injuries of AVF										
Never	0	0	0	0	36.02	0	0	0	0	28.21
Occasionally	2	4	30	60	.000	1	2	24	48	.000
Always	48	96	20	40		49	98	26	52	
Follow measures to maintain AVF free from infection										
Never	0	0	0	0	26.47	0	0	0	0	23.52
Occasionally	4	8	28	56	.000	2	4	23	46	.000
Always	46	92	22	44		48	96	27	54	
Avoid exposure to temperature extremes										
Never	0	0	5	10	27.66	0	0	4	8	31.73
Occasionally	3	6	22	44	.000	1	2	22	44	.000
Always	47	94	23	46		49	98	24	48	

Monitoring AVF thrill daily Never Occasio nally Always	**0** **1** **49**	**0** **2** **98**	**0** **20** **30**	**0** **40** **60**	**21.76** **.000**	**0** **0** **50**	**0** **0** **10** **0**	**0** **18** **32**	**0** **36** **64**	**21.25** **.000**
Monitoring signs &symptoms of complications Never Occasio nally Always	**0** **1** **49**	**0** **2** **98**	0 19 31	**0** **38** **62**	**20.25** **.000**	**0** **0** **50**	**0** **0** **10** **0**	0 19 31	**0** **38** **62**	**23.51** **.000**

Table (5): Distribution of both study and control groups as regards to developed arteriovenous fistula complications through the period of maturation

Group / Complications	Study		Control		Test of significant χ^2	P value
	No	%	No	%		
1- Thrombus	**1**	**2**	**4**	**8**		
2- Hematoma	**0**	**0**	**3**	**10**		
3- Bleeding +Hematoma	**1**	**2**	**4**	**8**	**13. 18**	**.022**
4- Bleeding	**1**	**2**	**3**	**6**		
5- Wound infection	**1**	**2**	**5**	**10**		
6- No complications	**46**	**92**	**31**	**60**		

Table (6) Time taken for maturation of arteriovenous fistula

Group / Days	Study		Control		Test of significant χ^2
	No	%	No	%	
40-50	**35**	**70**	**15**	**30**	**16.33** **.000**
50- 60	**10**	**20**	**20**	**40**	
≥60	**5**	**10**	**15**	**30**	
Mean ±SD **t P value**	**48.94 ± 8.97**		**54.96 ± 9.64**		**t= 3.23** **p =.002**

IV. DISCUSSION

Vascular access remains as the life line for patient with end stage renal disease who needs hemodialysis. A first access should be an arteriovenous fistula (21)· However, AVFs may be a risk factor for hospitalization in dialysis patients. Information about the possible complications of AVFs should contribute to their timely detection and allow actions to be taken that might prevent deleterious consequences that range from loss of vascular access to serious morbidity, and may ultimately be fatal. Consequently, AVF care should be a priority not only for patients but also for the all-inclusive professional team in the treatment of dialysis patients (22) the present study revealed that the mean age of study and control group was 44.04± 8.78 and 46.06± 8.48 years respectively. This resembles the study by (23) who observed that, mean age of study and control group of chronic renal failure was 41.45±13.53 and 45.69±14.99 years respectively· This may have confirmed by (24) who mentioned that with age increasing renal function decrease gradually. Concerning sex, the existing study illustrated that more than half of both groups were male. This study was in coincides with (25) who found that more than half of their sample was male. Also the present study was in accordance with most of studies and review of literature which found that chronic renal failure is more prevalent in males than females (26,27,28,29).

Concerning marital status, the majority of both groups were married. This finding is coincide with (29)، who illustrated that most of the subjects were married. In this study, it was detected that, less than half of studied sample had preparatory and secondary education. This was in agreement with (25) and (30) who clarified that the rate of joblessness is high among hemodialysis patients and this may clarify the findings of our study which showed that about half of studied sample didn't work.

Regarding to chronic diseases, the present study showed that the most common chronic diseases among both groups was hypertension. This finding is consistent with (31)., who mentioned that hypertension was highest among ESRD

In relation to total knowledge score, the current study showed that the majority of both groups had poor total knowledge score about arteriovenous fistula pre application of designed nursing intervention protocol. While there was a significant improvement in total knowledge score among study group than control group post application of designed nursing intervention protocol. These findings were in agreement with the findings of (32) who stated that a brief educational session resulted in increase in patients' knowledge compared with a control group that received no intervention. On the same line these results were agreement with (33,34,35) , who reported that there was a significant improvement between the study group than control group related to total knowledge score after education.· From the researcher point of view, the difference in knowledge score among study than control groups may be attributed to teaching that was provided about the arteriovenous fistula, and supported by illustrative colored booklet.

About practice the existing study indicated that pre application of a designed nursing intervention protocol there was insignificant difference between both group. While after application of a designed nursing intervention protocol there was significant differences between study and control group as regard to dressing change, arm and hand exercise, and palpating thrill. This results are supported by (36) who mentioned that total score of practice improved after one and three months' post teaching among study group than control one and (37) who found that the study group subjects recorded higher scores practice of performing breathing and coughing exercise than control group post intervention. As well as supporting this findings (38) who stated that the inadequate knowledge, probably, influenced the inadequate practice, from this context in the current study, patients received repeated clinical teaching sessions about how to perform self - care practice about arteriovenous fistula, including dressing change, arm hand exercise, palpating thrill of AVF until master the practice.

Findings of the current study indicated that compliance to instruction about self-care practices regarding arteriovenous fistula care was influenced by nursing clarification and explanation provided by the researcher through the application of a designed nursing intervention protocol. This was supported by (39), Who stressed upon the importance of possessing high level of intention and its influence on the improvement of patient's compliance. And in accordance (40) who revealed that the study sample had adequate self- reported adherence related to therapeutic regimen at three months' post program implementation, and (37) who stated that compliance to therapeutic regimen was enhanced in study group than control group after teaching session. In addition, (41) stated that significant positive correlation was found between knowledge and compliance in study group, from the researcher point of view compliance improved in the current study after teaching session about the importance of compliance to instructions about self-care practices regarding fistula care and its effect on prevention of AVF complications and acceleration of maturation.

Concerning to complication, the findings of the present study clarified that there was a low percentage of patients in study and control groups had arteriovenous fistula complications as thrombus, bleeding, hematoma, and infection. On the other hand, the majority of complications were significantly decreases among study group subjects. this results were the same line with (42) who mentioned that The complication rate and dysfunction rate were lesser among observational group as compared to control group. Also these findings are in accordance with. (43) who confirmed that protocol of care had appositive effect on reducing post- operative arteriovenous fistula complications in study group than control group. In addition, (44), concluded that Nursing techniques and self‑care of patients were correlated with the occurrence of complications therefore continuing education for patients is essential to increase the longevity of vascular access· Furthermore. From the researcher point of view this reduction of complications related to teaching sessions about self – care practice of fistula and repeated demonstration and remonstration until every individual mastered skill effectively and instructions about actions that must be followed and that must be avoided to prevent such complications.

Regarding to time taken for fistula to be ready for dialysis the findings of the current study revealed that time taken for fistula maturation was shorter among study group than control group this in coincide with (45), who observed that preparation and good care had an essential role in reducing complications and accelerating the fistula maturation in experimental group than control group. From the researcher point of view improving of fistula maturation attributed to compliance of study group to hand arm exercise with soft rubber ball. In addition to (46,47) who confirmed that hand exercise increase blood supply, increase artery and vein diameter therefore accelerate development and decrease morbidity and mortality related to fistula maturation Finally (48) arteriovenous fistula which had moral thrill was ready for heamodialysis· From the researcher point of view improving of fistula maturation attributed to compliance of study group to hand arm exercise with soft rubber ball

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