

## Effect of Self-Learning Package on Knowledge, Practice and Clinical Outcomes for Arteriovenous Fistula Patients with Renal Failure

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### Abstract

**Background:** Arteriovenous fistula is a lifeline which the hemodialysis patients need to take care of it. So, Self-learning package is a perfect individualized and face to face method of learning to maintain arteriovenous fistula functional status and prevent its related complications. **Aim:** was to evaluate the effect of self-learning package on knowledge, practice and clinical outcomes for arteriovenous fistula patients with renal failure. **Design and Setting;** A quasi-experimental study was conducted in the Dialysis Unit of student hospital and Dialysis Unit at Tanta International Hospital both affiliated to Tanta University Hospitals. A convenience sampling of (60) patients receiving hemodialysis through arteriovenous fistula, were divided into two equal study and control groups. **Tools:** three tools were used for data collection; Tool (I) Structured interview schedule, Tool (II) Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis (III) Index of independence of activities of daily living at AVF limb site and Tool (IV) Arteriovenous Fistula access site related complications assessment tool. **Results;** the main results revealed that there was a highly significant improvement in total knowledge level among study group patients, improvement in the patients' total self-care behaviors level and Furthermore, improvement in the patients' pain severity level. **Conclusion:** Self learning package had an effect on improving knowledge, self-care behaviors and decrease pain among arteriovenous fistula patients with renal failure **Recommendations:** encourage patient compliance to self-learning package & further studies to be conducted on a larger sample size.

**Key words;** arteriovenous fistula, functional status, self-learning package

## Introduction

End-stage renal disease (ESRD) is the last stage of chronic kidney disease (CKD), which is the gradual decrease of kidney function over time. Individuals with ESRD have substantial and permanent loss of kidney function, and require one of the available treatment modalities to survive. ESRD has become a public health concern worldwide and subsequently the total number of patients requiring one of the available treatment choices **Jin, (2023)**.

In Egypt, the national information center for health and population, 2023 had stated that the incidence of ESRD was about 483 per million, and here the most recent study at one governorate, the last statistics about prevalence of ESRD patients on regular hemodialysis in one governorate, El Beheira Governorate, Egypt in december 2023, was 581 pmp ,0.059%, **Hassan et al., (2023)**. Statistical records of dialysis unit at Student Hospital of Tanta University indicated that the number of patients admitted with ESRD for hemodialysis at (2024) was 253 patients .

The available treatment choices include dialysis, kidney transplant and medical management. Dialysis is used to relieve manifestations of ESRD or uremic status temporarily until the client regains kidney function or to sustain life in client with irreversible kidney disease.

Dialysis remains the most common form as a treatment modality for ESRD. According the United States

Renal Data System coding guidelines 2023, 92.3% of incident individuals with ESRD began therapy with dialysis. There are two types of dialysis, peritoneal dialysis and hemodialysis. Hemodialysis still the most common form of dialysis and is used for clients with acute or irreversible renal failure and fluid electrolyte imbalance. It is used to remove toxins and waste products from the blood throughout a dialyzer machine.

Hemodialysis is achieved through vascular access, either via arteriovenous fistula, graft, or central venous catheter. An Arteriovenous fistula is connection of an artery to a vein. This causes blood to flow directly from the artery into the vein, bypassing the capillaries that are located downstream of the fistula, resulting in diminished blood supply. AVF is the most preferred and recommended vascular access type because of its lower mortality and hospitalization rate **Prasad et al., (2021)**.

The success rate of fistulas is not uniform among patient. An effective hemodialysis treatment is dependent on a well-functioning vascular access which has good blood flow, excellent patency, and allows repetitive cannulation with two needles. Established AV fistulas require frequent routine monitoring to ensure continued patency. A failing AV fistula places the patient at risk for inadequate dialysis, which can lead to numerous complications and increased morbidity

and mortality. A fistula is a lifeline and patient needs to take care of it **Prasad et al., (2021)**.

Routine monitoring of AV fistulas by patients themselves can prevent complications related to AV Fistula. Thrombosis, stenosis, infection, hand edema, occlusion, bleeding and pain are the most prevalent complications of AV fistulas for dialysis. Moreover, psychological problems between anxiety sometimes up to depression is obvious among those patients either due to life style changes or pain or inability to perform daily living activities can be handled early by nursing staff **Balevi & Uysal , (2021)**.

The prevention of these physical and psychological complications can be carried out through the use of care which must be depended on self-care regarding the created vascular access. Nurses are considered to be the cause of success and the management of complications in dialysis units via their proper care for the patient with AV fistula.

The nurse should assess AVF regularly and should include listening with a stethoscope for a bruit, placing the palm of the hand over the access and feel a palpable thrill at the anastomosis, and observing the site for signs and symptoms of local and systemic infection.

Nursing staff guides the patient to implement care of the fistula by passing their own knowledge and needed practice, among which include: perform daily exercise, observe any change in the location of the fistula, as

heat, pain, erythema, and swelling, palpation and perception of the thrill.**Ekong et al., (2022)**.

Examination of the fistula and implementing proven infection control practices are essential to minimizing risk factors which compromise an efficient vascular access. Patients must follow the self-care instructions and practices given by the healthcare team members to maintain the patency of AVF and to protect their health. The complications can be prevented by keeping access protected by applied self-learning package **Gimata, (2022)**.

Self-learning package (SLP) is an individualized method of learning. Face to face teaching is disappearing and distance mode of education is becoming popular. SLP is developed to allow the learner to be free to select what, how, when and where to learn. This flexibility is an importance characteristic in open learning process. The learner becomes accustomed more and more to non-formal mode of education thereby shifting the preference to self-learning methods. SLP includes using of booklet, CD and displaying educational video through what's app application **El-Abbassy et al., (2021)**.

Furthermore, the SLP has greatly affect Patients knowledge, attitude and self-care practice that plays the foremost role in preventing complications and maintaining functional status of A V fistula, that Patients must be educated to avoid IV cannulation, taking blood pressure, tight compression bandage, excessive weight lifting, trauma,

sleeping on the arm bearing AV fistula and taking proper hygienic measures along with exercise manual compression and the measures to be taken in case of hematoma formation like cold compression and hot fomentation and elevation of the arm. This knowledge can be imparted to the patients collectively under SLP umbrella **Gallieni et al., 2020 & Kanaud et al., (2022).**

**The aim of this study was to:** Evaluate the effect of Self-Learning Package on knowledge, practice and clinical outcomes for arteriovenous fistula patients with renal failure.

**Research Hypotheses: -**

-Post implementing the SLP, the patients were expected to exhibit improvement in their knowledge and self-care behaviors regarding AVF than control group.

-Clinical outcomes post implementation of SLP were expected to be more better in the study group than control group who will receive routine hospital care.

**Subjects and Method**

**Design:** quasi experimental design was used in this study.

**Study settings: -**

The study was implemented at Dialysis Unit of Student Hospital and Dialysis Unit at Tanta International Educational Hospital; both of them are affiliated to Tanta University Hospital.

**Study subjects: -**

A convenience sampling of (60) adult ESRD patients receiving hemodialysis via AVF with who fulfilling the inclusion and exclusion criteria was

assigned based on Epi-Info software statistical to the total population admitted per year to upper endoscopy unit the sample size will be calculated as the following:

Z= confidence level 95%, d= Error proportion (0.05), P= population (40%).

**The sample was selected and divided into two equal groups 30 patients in each as follows;**

**Control Group:** 30 who received routine hospital care by nursing staff.

**Study Group:** 30 who received the deigned SLP proposed by the researcher.

**-Inclusion criteria of subjects:**

- 21-60 years

- Being under hemodialysis for more than 6 months.

- Receiving hemodialysis 3 times per week, for 3 or 4 hrs.

-Have no memory problems

-Hemodynamically stable

**Exclusion criteria were as follows:**

- Patients with central venous catheter and grafts vascular access

- Patients who were critically ill.

**Study tools:**

Four tools were used:-

**Tool I: Structured interview schedule:** This tool was developed by the researcher after reviewing recent related literature (**Gimata, 2022**).

It comprised of two parts as the following:

**Part (1): Socio- demographic and clinical data of the patients:** which includes; patient's code, age, sex, marital status, level of education,

weight, height, medical and surgical history.

### **Part (2): Arteriovenous Fistula Knowledge Assessment Sheet:**

It consisted of questions that are concerned with assessment of patient's knowledge about renal failure, arteriovenous fistula and its management.

#### **Scoring system of knowledge:**

Correct and complete answer scored (2), correct and incomplete answer scored (1) and don't know or incorrect answer (0)

**The total scoring system of the patient's knowledge was calculated and classified as the following:-**

Poor	< 60%
Fair	≥ 60% - 80%
Good	> 80%

**Tool II: Self-Care Behaviors Assessment sheet with Arteriovenous Fistula in Hemodialysis (ASBHD-AVF).** This scale was developed by **Sousa et al., (2015)** and was modified by the researcher. It consisted of 16 items distributed in two subscales: prevention of complications management of signs and symptoms .

**Scoring system:** Each item is scored according to a 3-point Likert scale. Final score is found by adding all item scores, with a minimum of 16 and a maximum of 48.

**The total scoring system of the patient's self-care behaviors percentage will be classified as the following:-**

Poor self-care behaviors	< 60%
Fair self-care behaviors	≥ 60% - 75%
Good self-care behaviors	> 75%

### **Tool III: Daily Living Activities**

**Index:** It was constructed by the researcher after reviewing of related literature (**Kashay, 2022 & Al-Manahry, 2022**) to assess effect of AVF on independence level over 8 aspects of daily living activities.

#### **Scoring system**

Each performance item was rated as: (0=dependent, 1=need assistance and 2=independence).

The score of the 8 items was summed up and classified as the following:

- The total score of (13-16)
- >75% indicates independence in daily activity.
- The total score of (8-12) ≥ 50-75% indicates need assistance.
- The total score of (0-7) <50% indicates dependence in daily activity.

**Tool IV: Arteriovenous Fistula access site related complications assessment tool:** it included the following;

**Part (1): Numerical Analogue Scale (NAS);** this tool was developed by **Mudgalkar et al., (2012)** and was adopted by the researcher for measuring pain among the HD patients and is designed to measure pain intensity in individual patients. It has a scale of 0–10.

**Part (2): Assessment of the access site infection:** This tool was developed by the researcher after reviewing of the

related literature (Meven. et al., 2020). It was used to assess 9 local signs and symptoms of infection at access site. It was scored (1) as present or (0) not present.

**Total scoring system of AVF infection site was calculated as the following:**

- (1-3) Mild AVF site infection.
- (4-6) Moderate AVF site infection
- (7-9) Sever AVF site infection

**Ethical consideration:**

This study was approved from the ethical committee on faculty of nursing university with code no 11711-2022. Informed consent was taken from every patient after clarifying the procedures and the purpose to participate in the study. They were informed about confidentiality of data collection, their right to refuse participation and to withdraw at any time without any consequences. A code number was used instead of name.

**An official permission** was obtained to conduct this study from the faculty authorities and from the Managers of the two previously mentioned settings.

**Content validity**

All tools were tested for content validity by seven jury of experts in the field of Medical-Surgical Nursing at the Faculty of Nursing and medical professor at Faculty of Medicine.

**A pilot study:**

Pilot study was conducted before the actual study on (6) ESRD patients receiving hemodialysis via AVF after taking their formal approval to test the clarity, feasibility, relevance of the tool used and applicability of the different

items of the determinant Tools. Modifications were done by the researcher and those patients were excluded from the study subjects.

**Reliability of the tool**

Alpha Cronbach's test was used to test tool reliability and the estimated reliability was 0.745 for tool I Part (1), 0.73 for part (2) and 0.804 for part (3). Also, it was found 0.733 for tool III and 0.745 for tool IV part (2).

**Data collection**

-Data were collected over a period of 12 months, started from February 2023 to January 2024.

**Self-learning package was conducted throughout four phases as follows:**

**A- Assessment Phase:**

-Assessment of the patient baseline data from patients and their current medical records using tool I part (1) for both control and study groups before implementing the designed nursing intervention.

-Assessment of patient knowledge using tool I part (3).

-Assessment of self-care behaviors using tool and independence level over daily living activities using tool III.

-Assessment of pain level using tool IV part (1).

-Assessment for presence of any local signs and symptoms of infection at AVF access site AVF using tool IV part (2).

**B-Planning Phase:**

-This phase formulated based on the study subjects' assessment were formulated. SLP was given by the researcher face to face communication with study groups in shape of

PowerPoint presentation, what's app group and a colored Arabic booklet that took about a month for development.

-It also included Preparing the environment; was performed to maintain privacy and Preparation of specific apparatus; were needed to apply SLP such as A silicon rubber ball which was needed for hand exercise and Suitable –sized AVF guard was introduced to the study group patients to support and protect AVF site.

### **C-Implementation Phase:**

**Group I (control group):** Who received the routine hospital nursing care as prescribed by medical team and included local assessment to AVF site prior insertion of needles, instructing patient to avoid moving AVF limb site, compression after needle removal and notify physician in case of presence of any AVF related complications.

### **Group II (Study Group)**

The SLP was carried out by the researcher throughout (4) basic sessions:

#### **Session (1) ESRD and its treatment**

**Content of the session:** this session contained a theoretical part in which the researcher met every participant from the study group individually to inform him or her about knowledge that included; ESRD and arteriovenous fistula for (45-60) minutes.

#### **Session (2): knowledge about AVF management**

**Content of the session:** This session contained knowledge about management Arteriovenous Fistula that took about (45-60) minutes.

#### **Session (3): AVF physical examination**

**Content of the session:** this session included the practical demonstration of AVF physical examination and Principles for preventing injuries. It took about an hour.

#### **Session (4): AVF self-care**

**Content of the session:** this session included needed care regarding; post procedure assessment, demonstrating proper post dialysis AVF pressure, palpating and feeling for vibration, performing exercise related to AVF such as rubber ball squeezing and grapping a cloth clip. Patients demonstrated AVF site cleaning with soapy water or another prescribed antiseptic solution. The time needed was about (1:1.30) hours.

#### **D-Evaluation Phase :**

Every patient in both groups was being assessed 3 times:-

**1-First time:** before applying SLP using Tools I, II, III and IV.

**2-Second time:** on 2<sup>nd</sup> week post applying SLP using Tools I, II, III and IV.

**3-Third time:** at the 4<sup>th</sup> week applying SLP using Tools I, II, III and IV.

#### **Results**

**Table (1): Distribution of the studied arteriovenous fistula patients regarding their socio-demographic characteristics. (n=60).**

The table reveals that (53.3%, 56.6%) of control and study group patient respectively were aged (50-60) years. Also the table revealed that approximately more than half (56.6%, 60%) of control and study group

patient respectively were females. Also, nearly half (46.6%, 53.3%) of the control and study groups respectively were secondary educated.

Additionally, the table reveals that more than half (63.3%, 60%) from control and study group were from rural areas. Moreover, it was found that more than three quarters (76.6%, 83.33%) of the control and study groups respectively weren't smokers. Furthermore, there was no statistical significance difference between the study and control groups regarding all items of bio socio-demographic data of the patients.

**Figure (1): Distribution of the studied both groups regarding their total knowledge level throughout periods of intervention.**

**Concerning to the control group,** there was no statistical significant in the patients' total knowledge level, where about more than three quadrants (83.3%, 80% and 80%) had poor level of knowledge pre, 2<sup>nd</sup> and 4<sup>th</sup> week after receiving the routine nursing care respectively. **On the other hand, concerning the study group;** the figure shows that there was a highly statistical significant improvement in the patients' total knowledge level, where more than three quarters (80.00%) had poor level of knowledge pre applying SLP whereas more than three quarters (80.%, 76.6%) had scored good levels of knowledge at the 2<sup>nd</sup> and 4<sup>th</sup> weeks after applying SLP.

**Figure (2): Distribution of studied both groups regarding total level of**

**self-care behaviors throughout periods of intervention.**

**Concerning to the control group,** there was no statistical significant in the total level of self-care behaviors where (76.6. %, 73.3% and 73.3%) had poor total level of self-care behaviors pre, 2<sup>nd</sup> and 4<sup>th</sup> week after receiving the routine nursing care respectively.

**On the other hand, concerning the study group;** the figure shows that there was a highly statistical significant improvement in the patients' total self-care behaviors level, where more than three quarters (80.00%) had poor level of self-care pre applying SLP whereas one third and two thirds (33.3%, 66.6%) had scored good levels of self-care at the 2<sup>nd</sup> and 4<sup>th</sup> weeks after applying SLP.

**Figure (3): Distribution of the studied both groups regarding their total level of daily living activities throughout periods of intervention.**

**Concerning to the control group,** there was no statistical significant in the patients' total level of daily living activities, where the majority (90%%, 86.6% and 90%) needed assistance at their daily living activities pre, 2<sup>nd</sup> and 4<sup>th</sup> week after receiving the routine nursing care respectively. **As for the study group;** the figure shows that there was a highly statistical significant improvement in total level of daily living activities, where more than three quarters (83.3%) needed assistance pre applying SLP whereas (40%) and half (50%) were independent at the 2<sup>nd</sup> and 4<sup>th</sup> weeks respectively after applying SLP.



**Table (2): illustrates distribution of the both studied groups regarding the pain severity level using numerical analogue scale throughout periods of intervention.**

The table shows that, **concerning to the control group patients;** nearly half (53.33%, 53.33% and 50%) of the control group had moderate pain level pre ,two and four weeks post receiving routine care respectively. **Concerning to the study group patients,** the table reveals that (60% ) of the study patients had moderate level of pain pre applying SLP package, while (66.67% and the majority ( 90%) of the study patients had only mild pain at the 2nd week and 4<sup>th</sup> week post applying SLP respectively. There was a high statistical significant improvement among the study group patients with p value= 0.000.

**Figure (4): Distribution of the both studied groups regarding total level of access site infection throughout periods of intervention.**

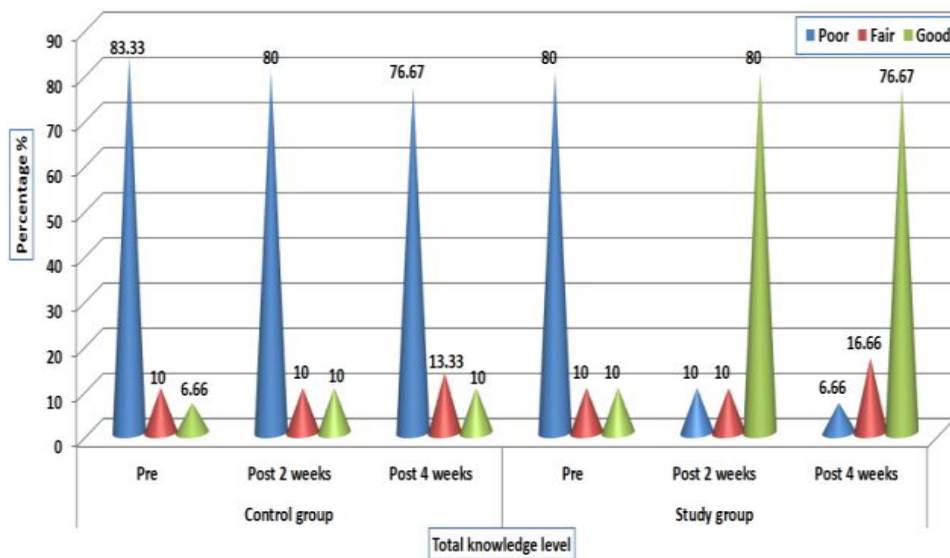
**Concerning to the control group,** there was no statistical significant in the total level access site infection post receiving routine care. **On the other hand, concerning the study group;** the figure shows that there was a statistical significant improvement in the patients' total level of access site infection where two third (66.6) of the study group patients were in grade (1) pre applying SLP whereas (60%) of the study patients were in grade (1) 2nd week and half (50%) of them were in grade (0 and 1) 4<sup>th</sup> week post applying SLP respectively.

**Table (3): Correlation between knowledge score of the patients and other tools among the studied groups throughout periods of study.**

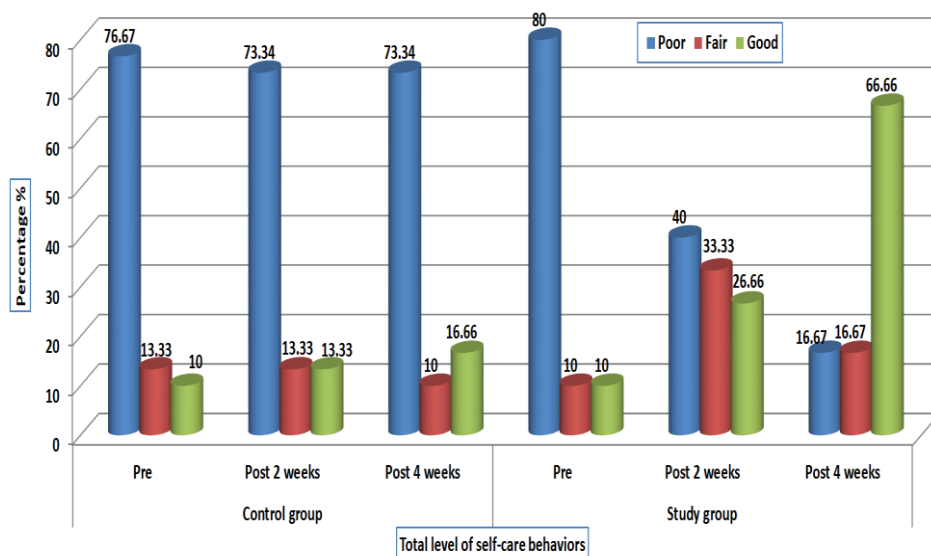
**Concerning to the control group,** the table reveals that there was no significant correlation between the total knowledge score among the control group patients and the other study tools (Self-care behaviors, Daily living activities, Pain severity, Access site infection and Hospital anxiety and depression) throughout periods of study. On the other hand, **concerning to the study group,** there was a significant positive correlation between the total knowledge score among the study group patients with their self-care behaviors at the 2<sup>nd</sup> week and daily living activities at 4th week post applying SLP where  $p=( 0.004$  and  $0.029)$  respectively .Also, there was a significant negative correlation between the total knowledge score among the study group patients and with their pain severity at the 2nd with P value = 0.047.

**Table (1): Distribution of the studied arteriovenous fistula patients regarding their socio-demographic characteristics.**

Characteristics	The studied patients (n=60)				$\chi^2$ P
	Control group (n=30)		Study group (n=30)		
<b>Age (in years)</b>					
(20-<30)	1	3.33	1	3.33	0.268 0.966
(30-<40)	3	10.00	4	13.33	
(40-<50)	10	33.33	8	26.67	
(50-60)	16	53.33	17	56.66	
<b>Range</b>	<b>(29-60)</b>		<b>(29-60)</b>		t=0.010
<b>Mean <math>\pm</math> SD</b>	<b>51.33<math>\pm</math>7.85</b>		<b>51.53<math>\pm</math>7.56</b>		P=0.920
<b>Gender</b>					
Male	13	43.33	12	40.00	FE
Female	17	56.66	18	60.00	0.604
<b>Marital status</b>					
Single	2	6.67	2	6.67	0.00 1.00
Married	20	66.67	20	66.67	
Widowed	8	26.67	8	26.67	
<b>Level of education</b>					
Illiterate	3	10.00	3	10.00	2.89 0.409
Primary education	8	26.67	6	20.00	
Secondary education	14	46.66	16	53.33	
Highly educated	5	16.67	5	16.67	
<b>Residence place</b>					
Rural	19	63.33	18	60.00	FE
Urban	11	36.66	12	40.00	1.00
<b>Occupation</b>					
Not work or retired	8	26.67	9	30.00	5.91 0.319
Employee	5	16.67	4	13.33	
Manual work	7	23.33	8	26.67	
Housewife	10	33.33	9	30.00	
<b>Smoking</b>					
Yes	3	10.00	2	6.67	0.426 0.808
No	23	76.67	25	83.33	
Ex smoker	4	13.33	3	10.00	



**Figure (1): Distribution of the studied both groups regarding their total knowledge level throughout periods of intervention.**



**Figure (2): Distribution of the studied both groups regarding their total level of self care behaviors throughout periods of intervention.**

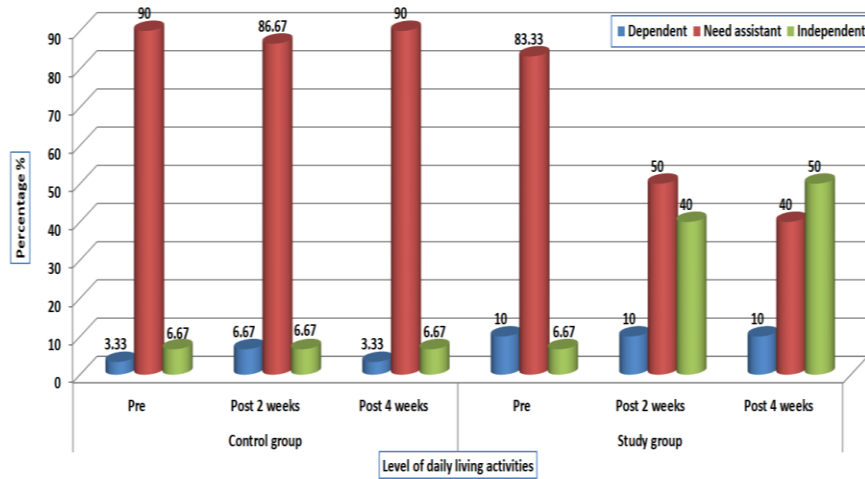


Figure (3): Distribution of the studied both groups regarding their total level of daily living activities throughout periods of intervention.

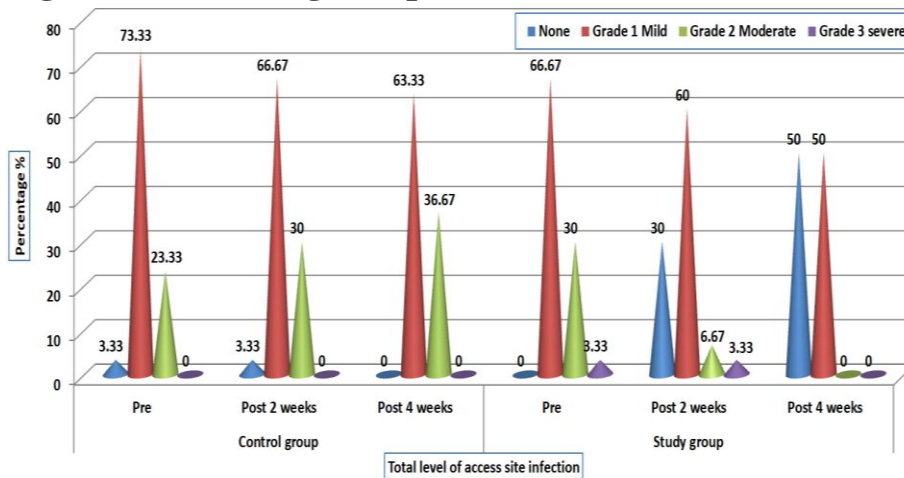


Figure (4): Distribution of the both studied groups regarding total level of access site infection throughout periods of intervention.

Table (2): illustrates distribution of the both studied groups regarding the pain severity level using numerical analogue scale throughout periods of intervention.

Pain Severity Level	The studied patients (n=60)													$\chi^2$ P
	Control group (n=30)						$\chi^2$ P	Study group (n=30)						
	Pre		Post 2 weeks		Post 4 weeks			Pre		Post 2 weeks		Post 4 weeks		
	N	%	N	%	N	%		N	%	N	%	N	%	
Mild	11	36.67	12	40.00	12	40.00	0.11 0.99	9	30.00	20	66.67	27	90.00	23.69 0.000*
Moderate	16	53.33	16	53.33	15	50.00		18	60.00	8	26.67	3	10.00	
Severe	3	10.00	2	6.67	3	10.00		3	10.00	2	6.67	0	0.00	

**Table (3): Correlation between knowledge score of the patients and other tools among the studied groups throughout periods of study.**

	The studied patients (n=60)											
	Total knowledge score											
	Control group (n=30)						Study group (n=30)					
	Pre		Post 2 weeks		Post 4 weeks		Pre		Post 2 weeks		Post 4 weeks	
R	P	r	P	R	P	r	P	R	P	R	P	
Self-care behaviors	0.015	0.937	0.072	0.707	0.055	0.773	0.308	0.098	0.511	<b>0.004**</b>	0.108	0.572
Daily living activities	0.177	0.350	0.200	0.290	0.195	0.303	0.148	0.434	0.248	0.186	0.399	<b>0.029*</b>
Pain severity	-0.290	0.120	-0.212	0.261	-0.332	0.073	-0.253	0.177	-0.366	<b>0.047*</b>	-0.051	0.790
Access site infection	-0.060	0.752	0.021	0.912	-0.153	0.420	0.198	0.294	-0.132	0.486	0.191	0.312

**Discussion:**

Self-learning package is an individualized method of learning. Face to face teaching is disappearing and distance mode of education is becoming popular. Furthermore, SLP has greatly affect Patients knowledge, attitude and self-care practice that plays the foremost role in preventing complications and maintaining functional status of AV fistula. This knowledge can be imparted to the patients collectively under SLP umbrella **Gallieni M, (2020) & Kanaud B et al., (2022).**

Concerning to socio demographic characteristics of the studied patients, the current study results revealed that more than half of control and study group patient were aged (50-60) years also more than half of control and study group patient were females. This may be attribute to most people in their late 50s or older; their risk for ESRD is increased due to presence of some

chronic diseases such as hypertension, diabetes mellitus and prostatic enlargement.

This result was supported by **Nutren et al., (2022)** and with **Nazan, (2023)**, who reported that half of the studied patients with ESRD were aged (50-60) years. As regard to place of residence and educational level of the patients, the study results revealed that more than half of the studied groups were from rural areas, this may be due to decreased specialized dialysis units and health insurance services at rural areas comparing to urban ones. While, nearly half of them were secondary educated.

This result was in agreement with **Gouda et al., (2021)**, who reported that less than half of the studied patients in the population-based screening program for ESRD in Damanhour, Egypt were low educated while more than half of them were from rural areas.

As regard levels of knowledge throughout all SLP intervention period; the study result revealed that;

Concerning to the study group (group I); there was a highly statistical significant improvement in the patients' total knowledge level, where more than three quadrants had poor levels of knowledge pre applying SLP whereas more than three quadrants had scored good levels of knowledge at the 2<sup>nd</sup> and 4<sup>th</sup> week post applying SLP.

The improvement in the study group patients' total knowledge emphasizes that the planned teaching sessions were effective in increasing knowledge scores for the studied patients, this improvement resulted from two reasons:

- 1- The good selection of the content of the knowledge part to fit the socio-demographic characteristics of the patients.
- 2- Being there, the researcher, with every study group patient individually encouraged the patient to ask freely.

This result was supported by **Hossein et al., (2022)**, who documented that there was a significant improvement in patient knowledge in his study after implementing continuous programs to increase their knowledge regarding HD and AVF. **Moreover**, the result was in harmony with **Mancins et al., (2023)**, who showed that the minority of hemodialysis patients in pretest had poor knowledge regarding HD, AVF and its daily hygiene while two third of patients in posttest had good knowledge level.

**In relation to level of self-care behaviors, the study result revealed that** there was a highly statistical significant improvement in the total level of self-care behaviors throughout

periods of study among study group patients; where more than three quarters had poor level of self-care pre applying SLP whereas one third then two thirds had scored good levels of self-care at the 2<sup>nd</sup> and 4<sup>th</sup> weeks after applying SLP.

This result agrees with **Pessoa et al., (2023)**, who reported that about two third of studied hemodialysis patients had poor level of AVF self-care behaviors While after instructional guidelines it was found that more than half of them were at good level of AVF self-care behaviors.

Also, the results were consistent **FA phanet al., (2023)** who reported that there significant improvement in total level of self-care behaviors among hemodialysis patients where the majority of the studied patients were at low level of self-care behaviors compared to nearly two third of them were at high level of self-care behaviors post receiving an educational intervention .

Finally, this was supported by **Tinghai et al., (2024)** ,who concluded that proper designed educational activities is such experience that significantly affects levels of AVF self-care behaviors among hemodialysis patients. As regard to level of daily living activities, the study result revealed that there was a highly statistical significant improvement in the total level of daily living activities throughout periods of study among study group patients; where more than three quarters needed assistance pre applying SLP whereas more than one third, then half of them

were independent at the 2nd and 4th weeks after applying SLP.

The improvement in the study group can be attributed to the effectiveness of the designed SLP that started with proper estimating of patient knowledge needs including benefits and examples for AVF limb exercise then applying it, measures to prevent injury and wearing suitable sized AVF guard which in turn provided insurance and increased patient self-dependence over many aspects of daily living activities.

This result was supported by **Suree Yet.al,(2023)**,who reported that about half of the studied patients in the Royal Free Hospital, London, in this study used AVF guard to improve their daily living activities level. **On the other hand**, the finding was contradicted with **Couchoud et.al., (2020)** ,who reported that more than one third of the studied suffered from comorbid diseases which seriously hindered their daily living activities.

As regard to pain severity level, the study result revealed that there was a highly statistical significant improvement in the patients' pain severity level throughout periods of study among study group patients (group I); where more than half had moderate pain pre applying SLP whereas two third, then the majority of them had mild pain at the 2nd and 4th weeks after applying SLP. This improvement can be attributed to the effectiveness skin hygiene both at home and dialysis unit, hot and cold compression as indicated, prevention and self-management of AVF site hematoma.

the study results was consistent with **Tsuchiura et.al, (2024)**, who reported that there was a highly statistical significant improvement in the pain severity levels among study group patients where about half of the study group patients had moderate pain pre compared to one half of them had mild pain post applying AVF self-care practices.

On the other hand, the finding of the present study was in contrast with **Couchoud et.al, (2020)**, who reported that about half of the studied patients on maintenance hemodialysis suffered from comorbid diseases which are associated with chronic pains such as diabetic neuropathy. In relation to level of access site infection, the study result revealed that there was a statistical significant improvement in the patients' total level of access site infection where two third of the study group patients were in grade (1) pre applying SLP whereas more than half of them were in grade (1) 2nd week and half of them were in grade (0 and 1) 4<sup>th</sup> week post applying SLP respectively.

This improvement can be attributed to the effectiveness skin hygiene both at home and dialysis unit. Moreover, the proper disinfection at AVF punctures site pre needle insertion which was implemented by the researcher. The results were consistent with **FA phan, et.al, (2023)**, who reported that there was significant improvement among AVF patients who have a tendency of accelerated infection's evolution. In these cases, prophylactic antibiotic treatment alone is not enough as in the

association of daily skin hygiene which is the key to success.

Regarding to the correlation between total knowledge scores of the patients with their self-care behaviors and daily living activities, for the study group, The result revealed that there was a significant positive correlation between the total knowledge score among the study group patients with their self-care behaviors at the 2<sup>nd</sup> week and daily living activities at 4th week post applying SLP.

Concerning to the control group, there was no significant correlation between the total knowledge score among the control group patients and their Self-care behaviors or Daily living activities throughout periods of study.

This result was consistent with **Yuka et.al,(2020)**,who documented that there was a significant positive correlation between applied knowledge about AVF and improved self-care behaviors. Also, the study was in harmony with **Eniva et.al, (2022)** the study result revealed that there was a there was a significant positive correlation between Patients' knowledge about principles of AVF limb exercise and increased patient dependence in his daily living activities. Moreover, the study was consistent with **Ardashir et.al, (2023)** who reported that there was a significant positive correlation between Patient awareness of possible AVF access related complications and improved self-care behaviors.

Concerning the correlation between total knowledge scores of the patients with their pain level for the study group, the result revealed that there was a

significant negative correlation between the total knowledge score among the study group patients with their pain severity at the 2nweek and post applying SLP.

**Regarding the control group**, there was no significant correlation between the total knowledge score among the control group patients and Pain severity and HADS throughout periods of study. This finding was agreement with **Prasad et.al,(2020)** who reported that there was a highly significant negative correlation between ESRD patient knowledge about AVF needle insertion and pain perception among study group patients.

### **Conclusion**

Based on the findings of the current study, it can be concluded that: The designed SLP led to improvement of knowledge and functional status of AVF for renal failure patient undergoing hemodialysis.

### **Recommendations**

Based on the findings of the current study, these following recommendations are derived and suggested:

#### **Recommendation for patients:**

-Hemodialysis patients should be encouraged to attend teaching sessions and educational programs about ESRD, HD and AVF.

-Hemodialysis patients should be encouraged to practice different forms of AVF self-care behaviors and a part of responsibility to maintain its functional status.

#### **Recommendations for nurses:**

-Teaching class to be developed supervised by hemodialysis unit at



Tanta University Hospital to establish and apply SLP.

-Distribution of researcher booklet to all patients with receiving hemodialysis session via AVF access.

-Reapplication of the study on larger random sample which is acquired from different geographical areas in Egypt.

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