

EFFECT OF SELF-CARE INTERVENTIONS ON ADHERENCE OF GERIATRIC PATIENTS UNDERGOING HEMODIALYSIS WITH THE THERAPEUTIC REGIMEN

Shaimaa Samir Abd El-Ghany Dawood, Marwa Ibrahim Mahfouz Khalil*, Nagwa Abd El Fattah Ibrahim

Faculty of Nursing, Alexandria University, Egypt

*Corresponding Author's Email: marwa871975@gmail.com

ABSTRACT

Background: End-stage renal disease (ESRD) is being increasingly recognized as a serious global health problem contributing towards double burden for both the individual and the society. It is frequently associated with disturbance in the adherence behaviors with the therapeutic regimen among the geriatric patients undergoing hemodialysis (HD). This triggers the initiation of self-care management which signifies the core skills, strategies, and approaches geriatric patients apply in their care to change unhealthy behaviors, improve capabilities, better outcome, and reduce utilization of health care services.

Aim: Determine the effect of self-care interventions on adherence of geriatric patients undergoing hemodialysis to the therapeutic regimen.

Materials and Methods: The study was carried out at two health care settings rendering hemodialysis services in Alexandria namely: the hemodialysis units of the Medical Research Institute and Sharq El Madina hospital which are affiliated to Alexandria University and the Ministry of Health and Population respectively. Using the convenient method, thirty-four (34) geriatric patients aged 60 years and above, undergoing hemodialysis for at least 6 months were selected from each of the previously mentioned settings in Alexandria.

Tools: Four tools were used for data gathering; Mini Mental State Examination (MMSE) Scale, Geriatric Depression Scale Short-Form (GDS-SF), Hemodialysis Geriatric Patients' Socio-Demographic and Clinical Data Structured Interview Schedule, and End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ).

Results: The mean scores for adherence to the therapeutic regimen have improved significantly after the implementation of the self-care interventions, immediately and after 6 weeks.

Recommendations: Preparation of an instructional booklet and posters including the self-care interventions of ESRD must be distributed to all HD units. An Educational centre in hospitals where geriatric patients attend for dialysis must be established. These must be equipped with the necessary materials, and audio-visual aids in order to help increase patients' knowledge about their condition. The patient can be involved in the management of their disease to improve their adherence to their therapeutic regimen.

Keywords: *Geriatric patients, End-stage renal disease, Self-care, Hemodialysis*

INTRODUCTION

Chronic nephritic disease is a challenging public health crisis and one of the most widespread noncommunicable diseases that globally affects 10% of

the world population (Couser *et al.*, 2011). It was ranked 12th in the list of the commonest cause of mortality worldwide, accounting for 1.1 million mortality cases and an increase of the total mortality rate by 31.7% along

the last decade (GBD 2015, 2016). Substantial evidence suggested that it is epidemic in many developing countries especially among elderly population. In the age group 64 -74 years in the world, estimation reports revealed that one in each five male elderly and one in each four female elderly suffered from chronic nephritic disease (De Nicola & Zoccali, 2016).

The dramatic consequence of chronic nephritic disease is the progression to end-stage renal disease (ESRD), which was recently labelled as chronic kidney disease stage five. In 2013, the adjusted prevalence of ESRD per million was 6.347 for ages 65-74 years and 6.275 for ages 75 years and over (National Center for Chronic Disease Prevention and Health Promotion, 2014). In Egypt, ESRD is on a staggering rise which is exerting a huge burden on health system. According to the most recent Egyptian renal registry in 2008, the prevalence of ESRD is 483 per million population and the total recorded number of ESRD patients on dialysis is 40000 (Mahmoud *et al.*, 2010). Changes in the renal work with normal old age increase the susceptibility of elderly patients to kidney dysfunction. With progressive aging, the kidney undergoes anatomical and physiological age-associated changes because of either organ senescence or other specific conditions, especially atherosclerosis, diabetes, obesity, and hypertension in addition to acute nephritic injury that are highly prevalent in older age group. Nephrosclerosis and lower glomerular density both contribute to GFR decline with old age (Stevens, Vishwanathan & Weiner, 2010). ESRD occurs when 90% of the nephrons are lost, and the GFR is less than 15 ml/min per 1.73 m². Patients at this phase experience chronic and persistent abnormal nephritic function with elevated creatinine and blood urea nitrogen levels in urine but the waste products are filtered out or sometime urine production may cease (Schaeffner *et al.*, 2012).

The diagnosis of ESRD in older adults is a challenge because of the non-classical presentations of the disease and presence of symptoms of other comorbidities as heart diseases and dementia that can mask the manifestations of ESRD and prevent or delay the diagnosis and subsequent management. In general, the geriatric patients with ESRD experience troubled water and electrolyte level regulations, impaired excretion of waste products, acid-base imbalance and hematological dysfunction (Ahmed, Brown & Abdelhafiz, 2010).

The available treatment options for ESRD are conservative therapy termed as renal replacement therapy (RRT), or hemodialysis, peritoneal dialysis and kidney replacement by transplantation. About 63.9% of all reported ESRD sufferers were receiving hemodialysis therapy, 6.9% treated with peritoneal dialysis, and 29.3% gave a chance for kidney transplant surgery (USRDS Annual Data Report, 2015). In Egypt, the total recorded number of ESRD patients on dialysis is 40000. Ninety-eight percent of those patients are on hemodialysis (HD) and are treated using about 3000 machines in just over 600 dialysis units (Mahmoud *et al.*, 2010; Nayak *et al.*, 2009). For geriatric patients who progress to ESRD, HD is often a valuable and life-saving treatment option. HD involves the use of a synthetic kidney for disposing waste products and excess water from the patient's blood. A hemodialysis treatment usually takes 3 to 4 hours and is done three or four times a week. Several types of access are available. These include immediate access, an arteriovenous fistula, and an arteriovenous graft. Although advances in dialysis treatment have contributed to improved permanence of patients with ESRD, it may also create, increase, or prolong suffering in those patients. ESRD and HD are hazardous factors for adverse geriatric outcomes as increased mortality, hospitalizations, frailty syndrome, disability, cognitive dysfunction, subsequent falls and fall-induced injuries (Wen & Chan 2012).

Successful renal replacement therapy (RRT) of ESRD patients relies on proper patient self-care through adherence to significant aspects of the therapy, as attendance to sessions prescribed, restricted the amount of fluid intake, maintaining dietary modalities and adherence to complex and established medical guidelines (Alkatheri *et al.*, 2014). Adherence acquainted by the World Health Organization (2003) as "the state of being in accordance with the followed specifications or established manners in management, which matches with agreed health care provider recommendations in taking medication" (Hoyer & Roodin, 2009).

Self-management in ESRD is an individual's capability to manage the everyday effects of this condition. It involves a complex and diverse set of skills and activities that are influenced by knowledge and attitudes, such as confidence or self-efficacy. Individuals are tasked to apply these skills on a daily basis to solve disease-related problems and to set goals (Walker &

Buchbinder, 2012). Self-management support programs are expected to reduce costly health crises and improve health outcomes for ESRD elders. Such programs emphasize the patient's central role in managing their illness, help patients with medical management, maintaining life roles, and managing negative emotions, such as fear and depression. In addition, programs provide the geriatric patients with the necessary knowledge, skills, and confidence (self-efficacy) to deal with the disease-related problems and prepare them to collaborate with their health care professionals and the health care system (Dolores Arenas *et al.*, 2013).

Identifying the barriers to self-care in older adults is the first step in collaborating with a patient with ESRD to improve their self-management strategies. Barriers to self-management of geriatric patients with ESRD can be placed into five categories: physical, psychological, cognitive, economic, and sociocultural (Kugler, Maeding & Russell, 2011). One of the primary roles of the gerontological nurse is developing strategies to overcome barriers to self-care (by motivational interviewing, enhancing self-efficiency and peer support), helping the geriatric patients to improve their self-care capabilities (Bland, Cottrell & Guylar, 2008). The gerontological nurse has a vital role in increasing the geriatric patient's sense of control, allowing the greatest potential for independence and self-direction in daily activities, promoting social involvement and greater sense of involvement in their care. Ongoing evaluation is necessary, because ESRD is a lifelong condition that requires periodic teaching and reinforcement of knowledge as deficiencies are identified (Gerbino *et al.*, 2011).

Significance of the study

Despite predictions that better self-care can positively influence the adherence to therapeutic regimen of Egyptian geriatric patients with ESRD, there is a lack of evidence supporting this assumption. This study further helps to identify those susceptible to a diminished adherence to therapeutic regimen, due to lack of ability to integrate self-care approach in the management of ESRD geriatric patients undergoing hemodialysis.

Aim of the study: To determine the effect of self-care interventions on adherence of geriatric patients undergoing hemodialysis to the therapeutic regimen.

Objective

The specific objectives for this study were to:

1. Identify adherence of geriatric patients undergoing hemodialysis to the therapeutic regimen.
2. Determine the effect of self-care interventions on adherence of geriatric patients undergoing hemodialysis to the therapeutic regimen.

Operational definition of therapeutic regimen: In this study therapeutic regimen refers to hemodialysis sessions attendance, medication use, fluid restrictions, and diet recommendations.

MATERIALS AND METHODS

Study design: The study followed a pre-experimental research design (one group pre-test post-test).

Setting: The study was conducted at two health care settings rendering hemodialysis services for ESRD geriatric patients in Alexandria namely: the hemodialysis units of the Medical Research Institute (affiliated to Alexandria University Hospitals) and Sharq El Madina hospital (affiliated to the Ministry of Health and Population). These units were selected because they have the highest attendance rate.

Subjects: Using the convenient method, this study included thirty-four (34) geriatric patients aged 60 years and above, undergoing hemodialysis for at least 6 months (the period needed for accurate measurement of patient adherence to treatment modalities), with no cognitive impairment (score 24 and more on the Mini Mental State Examination (MMSE)), and no depression or mild depression (score 0 to 4 and 5 to 8 on the Geriatric Depression Scale Short Form (GDS-SF)).

Study methods

Tools: Four tools were used for gathering needed data.

Tool one: Mini Mental State Examination (MMSE) Scale

Developed by Folstein, Folstein & McHugh (1975), this is used for assessing cognitive function of the older adults. It consists of 30 questions with either Yes or No response and considered the investigation of cognitive domain including memory, orientation, attention, calculation, naming, repetition and language. The scale's validity and reliability are approved by Elhusseini

(2008) after Arabic translation of the thirty questions. It is used for the primary selection of the present study geriatric patients. Only the elders with normal cognitive function (scored 24-30) were included.

Tool two: Geriatric Depression Scale Short-Form (GDS-SF)

A 15-item self-report instrument developed by Yesavage *et al.* (1983) for assessing the presence of depression and general wellbeing in the elders with either Yes or No response for how geriatric patients felt over the past seven days. The scale's validity and reliability are approved by Elhousseini (2008) after Arabic translation of its fifteen items. It is used for the primary selection of the present study of geriatric patients. Only elders with no depression or mild depression (score 0 to 4 and 5 to 8 on the Geriatric Depression Scale Short Form (GDS-SF) were included.

Tool three: Hemodialysis geriatric patients' Socio-Demographic and Clinical Data Structured Interview Schedule

Developed by the researchers based on relevant literature to collect information from the hemodialytic geriatric patients about their socio-demographic data and medical health history such as duration of chronic renal failure, number and reason of previous hospitalization in the last year, presence of chronic diseases as hypertension and other renal diseases, and number and type of medications consumed.

Tool four: End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)

Developed by Kim *et al.* (2010), this tool is essential for capturing important aspects of ESRD and renal replacement therapy-related history; self-reported adherence behavior with the therapeutic regimen; knowledge and perceptions related to adherence behaviors and reasons for non-adherence. It consists of 46 questions/items divided into five sections. The first section pursues general data about patients' ESRD and renal replacement therapy (RRT)-related history (5 items), the second section deals with regular hemodialysis session attendance (14 items), the third section asks about medications use (9 items), the fourth section asks about fluid restriction (10 items), and the fifth section asks about diet recommendations (8 items). Responses to the ESRD-AQ utilize a combination of

Likert scales and multiple choices, as well as “yes/no” answer format. Each section includes scored items and other items analyzed by using descriptive statistics. The higher scores for each section reflecting better adherence.

Administrative design

Ethical consideration

Official letters were issued from the Faculty of Nursing, Alexandria University to the heads of the Medical Research Institute and Sharq El Madina hospital to obtain approval to carry out the study after informing each one about the purpose of the study. The date and time allotted for data gathering was informed. An informed written consent was obtained from each study subject to participate in the study after explanation of the study purpose. Anonymity and Privacy of the study subjects, confidentiality of the collected data and the patients' right to withdraw at any time were ensured.

Pilot study

A pilot study was carried out on 6 geriatric patients with end-stage renal disease undergoing hemodialysis to assess the applicability, clarity and feasibility of the study tools. Tool four (End-Stage Renal Disease Adherence Questionnaire) (ESRD-AQ) was tested for content validity by 5 experts in the related fields using Cronbach's coefficient alpha was 0.720 after being applied to 8 geriatric patients selected from the hemodialysis unit of Sharq El Madina hospital were not included in the study subjects.

Field work

The researchers developed the self-care interventions after reviewing the related literatures to be covered in 12 sessions over a period of 4 weeks, which included knowledge and skills required for self-care of geriatric patients with end-stage renal disease undergoing hemodialysis (such as therapeutic diet, fluid restriction, measuring the intake and output, measuring body weight, skin care, mouth care, nail care, and vascular access care, in addition to hemodialysis related problems and how to deal with it).

- The hemodialysis unit was attended every day except Friday. The patients were interviewed on an individual basis in the unit to select the study sample

that fulfilled the criteria. The researchers conducted the sessions on an individual basis, 3 times per week for each patient. The research was conducted from 4 to 5 sessions per shift.

- In each session, the researcher summarized the main points in the session followed by an interactive session. Also, the researcher asked the patient about the content of the session and gave him/her simple prizes to motivate him or her.
- During each session, flip chart was developed by the researchers (containing the main points of each session and its illustrative pictures) was used in order to clarify the desired knowledge and skills for each patient. Other teaching methods used were open discussion, demonstration and re-demonstration.
- By the end of each session, a handout including the content of the session was distributed to guide and enrich patients' memory about the activities which took place in the session. Along with all session, the researcher reviewed the action plan calendar to assess the older adult's commitment with the plan. The researcher examined the preset goals through self-care goal tracking form, giving a score for the older adult's achievement. The researcher was maintaining geriatric patients' motivation by giving positive feedback and reinforcement.
- Post the implementation of the self-care interventions, the researcher reassessed the study subjects' adherence with the therapeutic regimen two times, immediately after the implementation of the self-care interventions and then after 6 weeks. The evaluation of the effectiveness of the proposed self-care interventions was determined by using the proper statistical analysis. The data collection started from the beginning of August till the end of December 2015. Statistical analysis

Statistical analysis

After data were collected, it was revised, coded and fed to statistical software SPSS version 20.0 for analysis. Reliability of the tool was determined by Cronbach alpha. Frequency tables and cross tabulations were used to illustrate the results of categorical data. Quantitative data were summarized by the arithmetic mean, standard deviation and mean score percent. Comparison of means was done by Student *t*-test and One-Way Analysis of Variance (ANOVA). Effect size

was measured by Eta Squared.

RESULTS

Table 1: Socio-demographic characteristics of the study of geriatric patients (n= 34)

| Socio-demographic characteristics | No. n=(34) | % |
|--------------------------------------|---------------------|------|
| Sex: | | |
| Male | 21 | 61.8 |
| Female | 13 | 38.2 |
| Age in years: | | |
| 60- | 25 | 73.5 |
| 65- | 5 | 14.7 |
| 70 and more | 4 | 11.8 |
| Mean ± SD | 63.65± 3.915 | |
| Marital status: | | |
| Married | 26 | 76.5 |
| Widowed | 8 | 23.5 |
| Level of education: | | |
| Illiterate | 5 | 14.7 |
| Read and write | 10 | 29.4 |
| Basic education | 5 | 14.7 |
| Secondary education | 6 | 17.6 |
| University | 8 | 23.5 |
| Occupation before retirement: | | |
| House wife | 11 | 32.4 |
| Manual worker | 9 | 26.5 |
| Employee | 8 | 23.5 |
| Private business | 6 | 17.6 |
| Monthly income: - | | |
| Not adequate | 25 | 73.5 |
| Adequate | 9 | 26.5 |

More than one responses were given.

Table 1 represented that the study sample included 34 geriatric patients attending the hemodialysis units. Of these, 61.8% were males and 38.2% females. About 76.5% were married and 23.5% were either widows or widowers. For about 14.7% were illiterate and the same percent with basic education, while those who could read and/or write were 29.4%. The rest either completed their secondary (17.6%) or higher education (23.5%). Regarding pre-retirement occupation, 32.4% were housewives, 26.5% were manual workers, 23.5% were employees and 17.6% had private workers. The monthly income was sufficient as reported by 73.5% of the patients.

Table 2: Medical data of the study of geriatric patients with end-stage renal failure and being on hemodialysis (n= 34)

| Duration of having renal failure and being on hemodialysis | n=(34) | % |
|--|-------------------|-------|
| Duration of having renal failure (in years) | | |
| <5 years | 18 | 52.9 |
| 5<10 years | 13 | 38.2 |
| 10<15 years | 3 | 8.8 |
| Mean ± SD | 4.91±2.989 | |
| Family history of renal failure | | |
| No | 15 | 44.1 |
| Do not know | 11 | 32.4 |
| Yes | 8 | 23.5 |
| Presence of comorbidities # | | |
| - Hypertension | 31 | 91.2 |
| - Diabetes mellitus | 16 | 47.1 |
| - Cardiac diseases | 9 | 26.5 |
| - Renal diseases | 6 | 17.6 |
| - Bronchial asthma | 3 | 8.8 |
| Type of medication consumed # | | |
| - Calcium supplements | 34 | 100.0 |
| - Anemia medications | 31 | 91.2 |
| - Antihypertensive | 25 | 73.5 |
| - Hypoglycemic drugs | 16 | 47.1 |
| - Vitamins supplements | 15 | 44.1 |
| - Cardiac drugs | 9 | 26.5 |
| - Antihistaminic | 5 | 14.7 |
| Type of the vascular access | | |
| - Fistula | 24 | 70.6 |
| - arteriovenous graft | 6 | 17.6 |
| - Immediate hemodialysis catheter | 4 | 11.8 |

More than one responses were given.

Table 2 illustrates that the duration of renal failure and starting of HD ranged from one to thirteen years with a mean of 4.91±2.989 years. Hypertension was the most frequently reported comorbidity by HD geriatric patients (91.2%), followed by diabetes mellitus (47.1%), cardiac diseases (26.5%), renal diseases (17.6%) and bronchial asthma (8.8%). Regarding the prescribed medication consumed, all geriatric patients consumed calcium supplements (100.0%), followed by anemia medications (91.2%), antihypertensive (73.5%), hypoglycemic (47.1%) and heart diseases medications (26.5%). Antihistaminics were consumed by only 14.7% of the geriatric patients. About 70% of the studied

geriatric patients had arteriovenous fistulas, 16.6% had arteriovenous graft as methods of permanent vascular access, whereas only 11.8% had immediate catheters as a method of transient vascular access.

Table 3: Distribution of the study of geriatric patients according to the causes of non-adherence to the therapeutic regimen prior to implementation of the self-care interventions (n= 34)

| Causes of non-adherence of the study geriatric patients to their therapeutic regimen # | No=(34) | % | |
|--|---|------|------|
| The main cause of missing the dialysis sessions | Did not miss any session | 11 | 32.4 |
| | Transportation problems | 4 | 11.8 |
| | Hemodialysis access problems | 5 | 14.7 |
| | Physician (medical or surgical) appointment | 5 | 14.7 |
| | Hospitalization | 3 | 8.8 |
| | Physical or psychological disturbance | 8 | 23.5 |
| The main reason of shortening the dialysis session | Did not shorten the dialysis time | 10 | 29.4 |
| | Cramping | 6 | 17.6 |
| | Restlessness | 8 | 23.5 |
| | Low blood pressure | 7 | 20.6 |
| | Access problems | 8 | 23.5 |
| | Transportation problems | 2 | 5.9 |
| | Staff decision (as poor blood flow, clotting dialyzer, machine malfunction) | 2 | 5.9 |
| The main reason of non-adherence to the prescribed medications | Did not miss medications | 8 | 23.5 |
| | Forgot to take medication | 9 | 26.5 |
| | Forgot the prescribed guidelines of medication | 1 | 2.9 |
| | Medication cost | 6 | 17.6 |
| | hospitalization | 2 | 5.9 |
| Side effects | 17 | 50.0 | |
| The main reason of difficulty in following fluid restriction recommendations | No difficulty | 2 | 5.9 |
| | Unable to control fluid intake | 31 | 91.2 |
| | Don't understand how to follow the fluid restriction | 11 | 32.4 |
| The main reason of difficulty in following dietary recommendations | No difficulty | 1 | 2.9 |
| | unwilling to control what to eat | 6 | 17.6 |
| | Unable to avoid certain un recommended food | 12 | 35.3 |
| | Not understand what type of diet to follow | 23 | 67.6 |

More than one responses were given.

Table 3 mentions that the main cause of not undergoing dialysis sessions as reported by the geriatric patients was physical or psychological disturbance (23.5%), followed by hemodialysis access problems

and Physician appointment with the same percent (14.7%), while transportation problems and hospitalization was reported by 11.8% and 8.8% respectively patients. Access problems and restlessness were reported as the main cause of shortening the dialysis session by 23.5%, followed by hypotension and cramping (20.6% and 17.6% respectively), while staff decision (as poor blood flow, clotting dialyzer, machine malfunction) and transportation problems were reported by the same percent (5.9%). The main cause of non-adherence to the prescribed medications was side effects of medications (50.0%), followed by

“forgot to take medicines”, medication cost, and hospitalization 26.5%, 17.6% and 5.9% respectively. Unable to control fluid intake was the main cause of difficulty in following fluid restriction recommendations as it was reported by 91.2% patient, followed by “didn't understand how to follow the fluid restriction” (32.4%). About 67.6% reported that they did not understand what type of diet as the main cause of difficulty as there were no dietary recommendations, followed by unable to avoid certain un-recommended food and un-willing to control what to eat (67.6% and 17.6% respectively).

Table 4: Mean score of overall adherence, knowledge and perception about adherence and adherence behaviors of the study geriatric patients to their therapeutic regimen before and after implementing of the self-care interventions (n=34)

| Adherence to the therapeutic regimen | Before the interventions | | Immediately after the interventions | | 6 weeks after the interventions | | F | Significance | Eta Squared |
|---|--------------------------|-------|-------------------------------------|-------|---------------------------------|-------|---------|--------------|-------------|
| | Mean | SD | Mean | SD | Mean | SD | | | |
| Knowledge and perception about adherence | 14.97 | 2.747 | 17.50 | 2.428 | 18.35 | 2.228 | 17.152 | 0.000* | 0.267** |
| Adherence behaviors | 17.68 | 3.990 | 26.09 | 2.151 | 28.15 | 1.158 | 143.371 | 0.000* | 0.743** |
| Overall adherence | 32.65 | 4.777 | 43.59 | 3.362 | 46.50 | 2.654 | 87.307 | 0.000* | 0.638** |

*The difference is highly statistically significant at $p \leq 0.01$; ** The effect size of the self-care interventions is strong at eta squared ≥ 0.26 .

Table 4 shows that the mean score of both knowledge and perception of the geriatric patients about adherence to the therapeutic regimen, in addition to the total adherence mean score improved after the implementation of the self-care interventions which increases from 14.97 ± 2.74 , 17.68 ± 3.99 and 32.65 ± 4.777 respectively; to 17.50 ± 2.42 , 26.09 ± 2.15 and 43.59 ± 3.36 respectively immediately after and 6 weeks from the interventions

18.35 ± 2.22 , 28.15 ± 1.16 and 46.50 ± 2.65 respectively. The difference of improvement signed to be highly statistical significant for all ($P=0.000$). The effect size of the self-care interventions determined by eta squared was (≥ 0.26) which means that a strong effect of the self-care interventions on the knowledge and perception about adherence and the overall adherence behaviors of the study of geriatric patients.

Table 5: Distribution of the study of geriatric patients according to the adherence domains before and after implementing of the self-care interventions (n= 34)

| Adherence domains | Before the interventions | | | Immediately after the interventions | | | 6 weeks after the interventions | | | F | Significance | Eta Squared |
|------------------------------------|--------------------------|------|--------------|-------------------------------------|------|--------------|---------------------------------|------|--------------|-------|--------------|-------------|
| | Mean | SD | mean % score | Mean | SD | mean % score | Mean | SD | mean % score | | | |
| ▪ Hemodialysis sessions attendance | 12.88 | 3.22 | 47.7 | 17.79 | 2.06 | 65.9 | 19.21 | 1.04 | 71.1 | 71.78 | 0.000* | 0.592** |
| ▪ Diet | 7.06 | 0.89 | 41.5 | 8.71 | 1.45 | 51.2 | 8.68 | .95 | 51.0 | 24.04 | 0.000* | 0.327** |
| ▪ Fluids | 5.74 | 1.50 | 33.7 | 8.53 | 1.64 | 50.2 | 9.21 | 1.32 | 54.2 | 51.64 | 0.000* | 0.511** |
| ▪ Medications | 6.97 | 1.38 | 41.0 | 8.56 | 1.21 | 50.3 | 9.40 | 0.96 | 55.4 | 36.49 | 0.000* | 0.424** |

*The difference is highly statistically significant at $p \leq 0.01$, **The effect size of the self-care interventions is strong at eta squared ≥ 0.26

Table 5 denotes that statistically significant high improvement ($p=0.000$) was found in all adherence domains towards the therapeutic regimen (including hemodialysis sessions attendance, diet guidelines, fluids restrictions and medication consumption). The

effect size of the self-care interventions on adherence domains as determined by eta squared was ≥ 0.26 , which means that a strong effect of the self-care interventions on all domains of adherence of the study of geriatric patients on their therapeutic regimen.

Table 6: Comparison of the mean score of adherence of the study subjects according to their socio-demographic characteristics before and after implementing of the self-care interventions (n= 34)

| Socio-demographic characteristics | | Adherence of the study subjects to the therapeutic regimen | | | | | | F | Significance |
|-----------------------------------|---------------------|--|---------|-------------------------------------|-------|--------------------------------|--------|---------|--------------|
| | | Pre the interventions | | Immediately after the interventions | | 6weeks after the interventions | | | |
| | | Mean | SD | Mean | SD | Mean | SD | | |
| Sex | Male | 33.33 | 4.258 | 43.19 | 4.273 | 45.71 | 2.493 | 51.737 | 0.000** |
| | Female | 31.54 | 5.125 | 44.23 | 2.242 | 47.77 | 2.555 | | |
| | F & P | 1.221 | 0.277 | 0.653 | 0.425 | 5.356 | 0.027* | | |
| Age | <70 | 33.03 | 4.514 | 43.73 | 3.342 | 46.53 | 2.569 | 117.673 | 0.000** |
| | 70+ | 29.75 | 4.992 | 42.50 | 5.916 | 46.25 | 3.862 | | |
| | F & P | 1.829 | 0.186 | 0.401 | 0.531 | 0.038 | 0.845 | | |
| Level of education | Illiterate | 31.40 | 2.608 | 42.00 | 4.243 | 40.00 | 2.915 | 8.074 | 0.006** |
| | Read and write | 30.40 | 4.742 | 44.00 | 4.110 | 46.00 | 3.401 | | |
| | Basic education | 35.40 | 5.727 | 44.00 | 2.739 | 45.00 | 1.581 | | |
| | Secondary education | 31.67 | 3.724 | 42.33 | 3.615 | 46.70 | 2.898 | | |
| | Higher education | 34.60 | 3.362 | 45.80 | 2.864 | 47.80 | .837 | | |
| | Post graduate | 36.33 | 5.774 | 43.00 | 4.000 | 44.67 | .577 | | |
| F & P | 1.671 | 0.04* | 0.730 | 0.603 | 1.242 | 0.316 | | | |
| Income | Adequate | 32.68 | 4.741 | 44.11 | 3.764 | 46.92 | 2.739 | 30.609 | 0.000** |
| | Inadequate | 32.56 | 4.531 | 43.40 | 3.371 | 45.33 | 2.581 | | |
| | F & P | 0.946 | 0.005** | 0.249 | 0.622 | 2.425 | 0.129 | | |

*The difference is statistically significant at $p \leq 0.05$, **The difference is highly statistically significant at $p \leq 0.01$

Table 6 clarifies that immediately after implementing of the self-care interventions and after 6 weeks after implementing of the self-care interventions, there was upward trend in adherence mean score among the geriatric patients for both male and female HD geriatric patients (the improvement was highly statistically

significant $p=0.000$), in both geriatric patients less than 70 years and those 70 years (the improvement was highly statistically significant $p=0.000$) and HD of the geriatric patients of different educational classes and income (the improvement was highly statistically significant).

DISCUSSION

Adherence with the determined therapeutic schedule is a definitive factor for achieving acceptable therapeutic outcomes. Hemodialysis (HD) involves a complex treatment regimen which to be successful needs a number of self-management tasks including maintenance of poly-pharmacological treatment regimen, periodical monitoring and careful control over fluid and dietary intake followed by regular attendance for the dialysis sessions are required. It is a common problem among HD geriatric patients to experience non-adherence. It has been estimated that more than one half of those patients are non-adherent in some manner to their therapeutic regimen (Somma *et al.*, 2013), so this study primarily aimed to improve adherence of HD geriatric patients to treatment modalities through self-care interventions.

Nearly three quarters of the current study subjects are of the age 60 to less than 65 years with a mean age of 63.65 years (table 1). This result came in agreement with the USRDS data (2006), which reported that nearly one half of incident dialysis patients in the United States are senior citizens, with the median age of dialysis initiation was 64.4 years old. On the same line it is reported that the mean age of HD patients was 62.2 years (Nakai *et al.*, 2014). Another study (Elashry, 2010) revealed that the mean age of older adults with ESRD was 63.6 years and the majority of them lies in the same age group from 60 to less than 65 years.

In the present study the percentage of males was more prevalent than females (table 1); this may be related to the life style of most men (smoking and Farmers' job). Smoking can increase the risk of chronic kidney disease through pro-inflammatory state, oxidative stress, endothelial dysfunction, glomerulosclerosis and tubular atrophy. Farmers' job among the Egyptian males makes them at risk for interstitial nephritis due to the exposure to agrochemicals, dehydration and consumption of contaminated water. Add to that, male older adults are at risk for benign prostatic hypertrophy which may lead to reflux of the urine to the kidney and compromise the kidney functions. Similar finding was reported by Makusidi *et al.*, (2014), who studied hemodialysis performance and outcomes among ESRD patients and mentioned that ESRD predominantly affect males more than females.

The present study findings revealed that the majority of the study of geriatric patients have hypertension (table 2), and more than one half have diabetes mellitus which are the most common comorbidities of ESRD worldwide. Cardiac diseases represented nearly one third of the present study patients. A comorbidity which accompany the ESRD is a challenge for older adults on hemodialysis, in addition to the hemodialysis process itself, patients with comorbidities often take multiple medications and may need to spend time following therapeutic diet, fitting in physical activity, scheduling doctors' appointments in addition to going to the dialysis unit. Furthermore, the comorbidities can also worsen the renal outcomes in those patients. A study conducted in the USA by Fraser *et al.*, (2015) examined the burden of comorbidity in patient with chronic kidney disease and reported that the majority of their study patients have hypertension, more than one fifth have ischemic heart disease and less than one fifth have diabetes mellitus.

The present study results revealed that the overall adherence mean score was low before the application of the self-management tasks as compared to after the application (table 4). This may be due to the effect of the self-management tasks which succeeded in attracting and motivating the HD geriatric patients to tolerate the length of the sessions which may extend for 3 or 4 hours as well as to accept the restrictions imposed by the dialysis such as those related to diet, fluid intake and medications. This was achieved through increasing knowledge of the patients about ESRD, discussing barriers related to adherence and overcome them. Similar findings were shown in other studies where the prevalence of non-adherence to fluid restriction ranged from 30-70% and non-adherence to the dietary regimen ranged from 2-34% of patients for potassium intake and from 19-57% for phosphate intake (Gerbino *et al.*, 2011). Also, non-adherence to the medications in HD patients as recent studies shown was 19-99% (Karamanidou *et al.*, 2008). Non-adherence through skipping dialysis sessions varied from 7-32% among chronic HD patients (Durose *et al.*, 2004).

The present study revealed that the lower adhered domain as determined by mean score percent prior to the self-care interventions was the adherence to the fluids restriction (table 5). Hemodialysis patients cannot

excrete excess fluid from their bodies which may cause shortness of breath, muscle cramping, dizziness, anxiety, lung edema and hypertension. So, careful attention must be given to the amount of fluids intake. In the present study, inability to control fluid intake or understand how to follow the fluid restriction were the main causes of difficulty following fluid restriction recommendations (table 3). Dawood *et al.* (2016) revealed that most of hemodialysis patients had edema and distended jugular vein before the application of nursing care program and the patient returned to normal after following their prescribed amount of fluids.

The second compromised domain in this study prior to the implementation of the self-care interventions is following dietary guidelines as determined by mean score percent (table 5). As for the causes of difficulty in following the dietary recommendations reported by the study geriatric patients are lack of knowledge about type of diet regimen, unable to avoid certain un-recommended food, and un-willing to control what to eat (table 3). The result of the present study agrees with that of Kugler, Maeding & Russell, (2011) who significantly found a large number of HD patients in USA and German have difficulties maintaining their diet regimen.

Improper commitment to medication guidelines revealed by the present study findings, before the execution of the self-care interventions, which believed to account for worsening the disease state, increase health care costs, increase morbidity and mortality and lower the life quality (table 5). Reasons reported by the geriatric patients for their noncompliance to the prescribed treatment are adverse undesirable effects of medications, forgetting to take the medicines, medication cost and hospitalization (table 3). This indicates the magnitude of applying measures to remind patients to comply with their medicine. On the same line, Bland, Cottrell & Guyler, (2008) found that forgetfulness, inconvenience and scheduling barriers were the main causes reported for noncompliance among HD patients. In 2006, Holley and DeVore found that financial cost and insurance coverage were the leading causes for noncompliance among dialysis patients in Charlottesville Virginia.

Missed or shortened dialysis sessions are universal problems among HD patients. In spite of the low hemodialysis session attendance domain mean score in the current study was low before the application of the

self-care interventions, it remained the highest adhered domain (table 5). This may be due to the reality that all the patients were retired and they were not active as the younger generations. This is in agreement with Kauric-Klein (2013) who found that the older adults adhered to attendance of dialysis session than younger patients. Also, the role of the medical and nursing staff in the hemodialysis units which focus on educating and stressing the importance of keeping the appointment of HD (so that they do not skip or shorten the session) and the regular follow up of patient attendance to identify the reason for skipping any session.

The chief causes of missing the HD sessions before the application of self-care interventions in the current study were physical or psychological disturbance, followed by hemodialysis access problems and appointments respectively (table 3). On the other hand, the main etiologies of shortening the dialysis sessions were access problems and restlessness, followed by hypotension, cramping, and staff decision (as poor blood flow, clotting dialyzer, machine malfunction) respectively. On the same context, the study done by Obialo *et al.*, (2012) about the relationship of missed and shortened hemodialysis treatments to hospitalization and mortality, revealed that, 2.4% of the HD patients missed the dialysis sessions and 15.4% shortened the session time during a period of one month. The causes of these were due to poor adjustment of the HD patients to the diagnosis of ESRD and dialysis treatment, many physical, emotional and social problems, and poor satisfaction with the nephrologists.

The current study revealed consistent upward trend in the mean score of the overall adherence domains including attendance of HD sessions, diet, fluids, and medications from before the interventions, to immediately after the interventions and reach the highest level after 6 weeks of the interventions (table 4). This may be related to the effect of the implemented intervention on increasing the patients' knowledge related to hemodialysis and importance of adhering to medical regimens. This denotes the positive effect of the self-care interventions. Further, willingness of the ESRD geriatric patients to follow therapeutic regimens was developed by increasing compliance with the self-care interventions by teaching them in brief with time add for clarification, repetition, reinforcement,

discussion, answering questions of ESRD patient and family, and providing content to the patient after each educated dialysis session to guide so that they remember and follow the instructions. This is in agreement with other study carried out in Iran (Seyyedrasooli *et al.*, 2013).

Surprisingly, the lowest adhered domain in the current study is the inability of the patient to follow the fluid and dietary recommendations (table 5). This may be attributed to the reality that patients' commitment with the new dietary and fluids regimen is usually not easy and the older adult cannot accept it easily, as they are usually resistant to alter their life-style pattern and this requires more time. In addition, HD geriatric patients may suffer from comorbid diseases which may restrict their life style pattern more.

Patients' socio-demographic data are vital predictors for their degree of consistency with treatment specifications. The current study presented no difference between older males and females' adherence to their medical regimen before the execution of self-care interventions. Surprisingly after the intervention, the older females had higher adherence mean score than older males (table 6). This may be due to the fact that women are more concerned about their health than men particularly if they are supported and motivated. This result agrees with those of Kauric-Klein (2013).

Higher mean score of adherence was accompanied with higher educational levels (table 6). The educated patient might understand more easily the usefulness of the treatment, may have better healthy life style and better access to all level of health maintenance delivery settings profit or nonprofit organizations. The same was reported by Hala *et al.*, (2015) and Alkatheri *et al.*, (2014). Contrary to this result, no difference in adherence with education was reported by Kugler, Maeding & Russell (2011).

Monthly income significantly affected adherence of the ESRD geriatric patients to their therapeutic follow up before the intervention. Thus, increased monthly income is accompanied with higher adherence rate (table 6). This result may be interpreted by the fact that the older adult with adequate income is usually able to buy the required medications, foods, reach and attend the hemodialysis sessions easily. In the same line, Pang,

Ip & Chang (2001) found that the higher the monthly incomes, the greater the adherence obtained. This result contradicts the result of Clark-Cutaia *et al.*, (2014) who reported that income adequacy did not prove to influence outcome measures.

CONCLUSIONS

Implementation of the study self-care interventions proved to be successful in enhancing adherence of the ESRD geriatric patients to their therapeutic guidelines. The mean scores for adherence have improved after the application of the interventions than before it with a statistical significant difference.

The preset study recommended that

1. Self-care management of ESRD geriatric patients to be included in the gerontological nursing course.
2. Establishment of an educational center equipped it by suitable related materials, medias and audio-visual aids in hospitals where geriatric patients come for dialysis, to improve adherence of those geriatric patients to their therapeutic modalities
3. Instructional booklet and posters must be prepared for self-care interventions of ESRD and to be distributed at all hemodialysis units. Necessary criteria suited for geriatric patients should be included in the written materials.
4. In-service health education programs to be planned by the faculty staff members of the gerontological nursing department and offered on regular basis to the nurses at all hemodialysis units where geriatric patients attend. The program should include knowledge and practices of the personal-care management of ESRD geriatric patients recommended for hemodialysis.
5. Awareness must be spread among the public about the self-care management of end stage renal disease of geriatric patients through responsible personnel and mass media.

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