

Relation between Therapeutic Compliance and Functional Status of Patients Undergoing Hemodialysis

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Abstract Hemodialysis is the most common treatment modality for patients with end stage renal disease. The functional status of patients who underwent hemodialysis is decreased over time and may affect the patients' compliance with the treatment process. **Aim:** This study aimed to determine the relation between therapeutic compliance and functional status of patients undergoing hemodialysis through the following: (1) Assessment of functional status of patients undergoing hemodialysis. (2) Assessment of therapeutic compliance of patients undergoing hemodialysis. (3) Determine the relation between functional status and therapeutic compliance for patients undergoing hemodialysis. **Study design:** A descriptive -correlational research design was used to achieve the aim of this study. **Setting:** This study was carried out in the Hemodialysis Unit at Edku General Hospital affiliated to Health Insurance Hospitals at Elbeheira Governorate, Egypt. **Subjects:** A convenience sample of all patients (n=100 patients) undergoing hemodialysis in Hemodialysis Unit in Edku General Hospital were recruited to participate in this study. **Data collection tools:** (1) Patients' assessment tool: to assess demographic characteristics and clinical data of patients. (2) End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ): to assess therapeutic compliance for patients undergoing hemodialysis. (3) Choice Health Experience Questionnaire (CHEQ): to assess functional status of patients undergoing hemodialysis. **Results:** The results of the study showed that 69% of the studied patients were non-compliant to their therapeutic regimen, and 81% of them had poor level of functional status. **Conclusion:** The study concluded that there was statistically significant relation between overall functional status of patients undergoing hemodialysis and overall compliance with the therapeutic regimen. **Recommendations:** It is recommended to develop and educational booklet for patients undergoing hemodialysis to improve their adherence to the treatment regimen.

Keywords: functional status, hemodialysis, patients, therapeutic compliance

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1. Introduction

Chronic kidney disease (CKD) is a common public health problem that exerting a significant burden on patients and healthcare systems [1]. The Global Burden of Disease (GBD) study in 2017 suggested that, the global prevalence of CKD was 9.1% (697.5 million cases). In 2017, CKD resulted in 1.2 million deaths and was the 12th leading cause of death worldwide [2].

In Egypt, the estimated annual incidence of End Stage Renal Disease (ESRD) is around 74 per million and the total prevalence of patients on dialysis is 264 per million [3]. The prevalence of ESRD under hemodialysis (HD) in Damietta Governorate, Egypt in the year 2013 was found to be 611 per million populations [4].

Chronic kidney disease (CKD) is a condition characterized by a progressive loss of the renal function. The most common causes of ESRD include hypertension, diabetes mellitus, polycystic kidney disease, atherosclerosis, glomerulonephritis, prolonged obstruction of the urinary tract, recurrent pyelonephritis, and certain medications such as non-steroidal anti-inflammatory drugs (NSAIDs), calcineurin inhibitors, and antiretrovirals [5].

The treatment options for patients with ESRD include medications that can be prescribed to prevent or control the symptoms of CKD, hemodialysis (HD), peritoneal dialysis (PD) and kidney transplantation [6]. Hemodialysis therapy is the core of treatment for ESRD. Many patients who are undergoing hemodialysis suffer from multiple restrictions, complications and cognitive impairment. They often report dependent on others, unable to participate in daily activities and have an overall decrease in their functional status and quality of life overtime [7].

Functional status (FS) of the person is defined as the ability to perform normal daily activities required to meet daily basic needs, such as doing a job, self-care, taking care of family or social roles, and to maintain health and well-being. Functional status (capacity) of any individual may be affected by presence of chronic disease, impairments in physical, cognitive, sensory, or social function. A good FS score is associated with good quality of life. A low FS score is a key contributor to morbidity and mortality of patient undergoing hemodialysis [8,9].

Therapeutic compliance describes the degree to which a patient correctly follows medical advice. Compliance to treatment and diet guidance associated with HD is important and requires the patient to understand and accept the disease. Compliance to treatment has a positive effect to maintain health, quality of life and survival rates. Poor compliance to diet, liquid ingestion, medicine and dialysis regimens have accounted for worsening of disease states, death, and increased health care costs. This has led to increase morbidity and mortality rate of patient with CKD [10].

The management of these patients requires increase functional ability; enhance positive emotions and the expansion of satisfying social relations and role of patients [11]. Nursing interventions has been progressively identified as being increasingly important to the improvement of patients' compliance with dialysis such interventions, including education, training, and behavioral introduction, which help patients gain more knowledge about dialysis and develop healthy life habits, further improve their compliance with this treatment [12].

1.1. Significance of the Study

Chronic kidney disease is irreversible and result in progressive reduction of renal function. Patients who are undergoing hemodialysis experience a wide range of fundamental changes that have a negative impact on physical, mental, cognitive, economic, psychological, and social health status. All these problems impair the patient's role, functional capacity and ability to perform daily life roles and over time decrease quality of life of patients and impair their compliance to therapeutic regimen. It is important to assess the functional status of these patients and its effect on patient's compliance with treatment in order find ways that improve the functional capacity and enhance patient's compliance to treatment.

1.2. Aim of the Study

This study aimed to determine the relation between therapeutic compliance and functional status of patients undergoing hemodialysis through the following:

1. Assessment of therapeutic compliance of hemodialysis patients.
2. Assessment of functional status of hemodialysis patients.
3. Determine the relation between therapeutic compliance and functional status of patients undergoing hemodialysis.

1.3. Research Questions

1. What is the level of therapeutic compliance of patients undergoing hemodialysis?

2. What is the level of functional status of patients undergoing hemodialysis?
3. What is the relation between therapeutic compliance and functional status of patients undergoing hemodialysis?

2. Methods

2.1. Research Design

A descriptive co-relational research design was used to achieve the aim of this study. In descriptive co-relational study, the researcher is primarily interested in describing relationships among variables, without seeking to establish a causal connection [13].

2.2. Setting

This study was conducted in the Hemodialysis Unit at Edku General Hospital affiliated to Health Insurance Hospitals at Elbeheira Governorate, Egypt. Edku hemodialysis unit consist of 27 hemodialysis machines, 22 nurses working in the unit. The total patients are receiving hemodialysis in the unit were 100 patients (80 patients had hepatitis C and B negative, 18 had hepatitis C positive, 2 had hepatitis B positive). The unit consist of 3 rooms (first room has 20 bed for negative hepatitis C and B patients, second room has 6 bed for positive hepatitis C patients and the third room has 1 bed for positive hepatitis B patients).

2.3. Subject

A convenience sample of all patients (n=100 adult patients) undergoing hemodialysis in hemodialysis unit in Edku General Hospital affiliated to health insurance hospital at Elbeheira Governorate, Egypt were recruited to participate in this study.

2.4. Tools for Data Collection

2.4.1. Patients' Assessment Tool

This tool was developed by the researcher in an Arabic language. It includes the following two parts:

Part 1 includes patients' demographic characteristics (age, gender, marital status, residence, level of education, occupation and type of medical service). The questionnaire consisted of 7 questions in form of multiple choices.

Part 2 includes clinical data about patients' past, present, family history and laboratory investigations. This part was developed by the researcher and written in English language after reviewing recent related literature [14]. It included 8 questions. Present history of patient undergoing hemodialysis contained five questions (diagnosis, etiology of renal failure, dialysis duration, complications of renal failure and maintenance drugs), three questions about past history, family history and laboratory investigations.

2.4.2. End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ)

This tool was used to assess therapeutic compliance for patients undergoing hemodialysis. It was adopted from

[15]. The tool was translated into Arabic language and back translation into English was done again. It consisted of 46 questions/items divided into five sections.

The first section pursued general information about patients' ESRD and renal replacement therapy-related history (5 items), and the remaining four sections asked about adherence to hemodialysis treatment (14 items), medications (9 items), fluid restrictions (10 items), and diet recommendations (8 items). These four (4) final sections directly measure adherence behaviors (14, 17, 18, 26, 31, and 46), and patients' knowledge and perceptions about treatment (11, 12, 22, 23, 32, 33, 41, and 42). Responses to the ESRD-AQ utilize a combination of Likert scales and multiple choices, as well as "yes/no" answer format.

Scoring system: The adherence behavior subscale was scored by summing the responses to questions number (14, 17, 18, 26, 31 and 46). The weighting system for scores was determined based on the degree of importance relevant to clinical outcome of each dimension. For example, missing or shortening hemodialysis has been reported to have a stronger association with mortality of patients with ESRD than other components of adherence behavior; therefore, it was given more weight in computing the adherence scores.

The ESRD-AQ was designed such that higher scores indicate better compliance. It was classified as follows: Question number 14 measures hemodialysis - attendance and score range from (0-300). Question number 17 measures episode of shortening hemodialysis and score range from (0-200). Question number 18 measures duration of shortening hemodialysis if shortened and score range from (0-100). Question number 26 measures adherence to medication and score range from (0-200). Question number 31 measures adherence to fluid restriction and score ranged from (0-200). Question number 46 measures adherence to dietary restriction and score range from (0-200).

The attitude/perception subscale was scored by summing the responses to questions 11, 12, 22, 23, 32, 33, 41, and 42. The remaining questions obtain information about patients' ESRD and renal replacement therapy related history. Overall compliance of end-stage renal disease adherence questionnaire (ESRD-AQ) score were generally divided into:

- Noncompliance (700 - <1000).
- Compliance (≥ 1000) [16].

2.4.3. Choice Health Experience Questionnaire (CHEQ)

This tool was used to assess functional status of patients undergoing hemodialysis and was adopted from [17]. It was translated into Arabic language and back translation was done into English. The tool asked for the patient's views about their health. This information helped to keep track of how patients feel and how well patients were able to do their usual activities.

This tool consists of 23 questions. It includes 21 sections; physical functioning, limitations in usual role activities due to physical health problems, bodily pain, general health perceptions, vitality, social functioning, limitations in usual activities because of emotional problems, general mental health, cognitive function, sexual function, sleep, work, recreation, travel, finances,

general quality of life, diet, freedom, body image, dialysis access and symptoms.

Scoring system: Choice health experience questionnaire includes 21 domains and 23 questions. In addition, each item is scored on a scale range from 0 to 100, so that the lowest and highest possible scores are set at 0 and 100, respectively. Scores represent the percentage of total possible score achieved. Overall functional status score for patients undergoing hemodialysis were generally divided into:

- Poor (<50%)
- Fair (50% - <75%)
- Good ($\geq 75\%$).

2.5. Tools Validity and Reliability

The tools were evaluated in terms of face and content validity by a panel of five experts (two professors, two assistant professors, and one lecturer) from medical surgical nursing department, Faculty of Nursing of Ain Shams University. The experts reviewed the tools for clarity, relevance, comprehensiveness, simplicity and applicability. No modifications were done. After verification of validity of the questionnaires by experts, reliability of the tools was tested. The reliability was achieved via Cronbach's alpha; it was 0.798 for the end stage renal disease adherence questionnaire, and 0.872 for the choice health experience questionnaire.

2.6. Pilot Study

A pilot study was carried out on 10% of patients (10 patients) to test the applicability of the study and to ensure of clarity of the study questionnaires, as well as to estimate the time needed for each tool. No modifications were done for the used tools. Patients of the pilot study were included into the study subjects because no modifications were done after conducting the pilot study.

2.7. Ethical Considerations

The research approval was obtained from the faculty of nursing research ethics committee before initiating the study. The researchers clarified the purpose and aim of the study to patients included in the study. Oral consent was obtained from patients to ensure willingness to engage in the study. The researchers maintained anonymity and confidentiality of subjects' data. Patients were informed that they are allowed to withdraw from the study at any time without penalty.

2.8. Procedure

- Data were collected within 6 months from the beginning of November 2018 to the end of April 2019.
- The aim and nature of the study were explained by the researchers to all patients who were included in the study.
- An oral approval was obtained from patients to get their agreement to participate in the study prior to data collection.

- The researchers visited the study setting three days per week in the morning and afternoon shifts.
- The tools of data collection took about 70 minutes to be filled by the researcher.
- Demographic characteristics of the study subjects, took five minutes to be filled by the researcher. Patient's clinical data, took about ten minutes to be filled by the researcher from the patients and medical records.
- The end-stage renal disease adherence questionnaire (ESRD-AQ) took about 30 minutes to be filled, and the choice health experience questionnaire (CHEQ) took approximately 25 minutes to be completed by the researchers.
- The data were collected from each patient over 2 sessions, the first session to complete the demographic characteristic, clinical data and the ESRD-AQ, the second session to fill in the choice health experience questionnaire.

2.9. Data Analysis

The collected data were analyzed using the statistical package for social science (SPSS) version 20. Quantitative data were presented as mean and standard deviation (SD). Pearson coefficient test was used to determine the correlation between two quantitative variables. Qualitative data were presented as number and percentage (%). The significance of the observed difference was obtained at $p = 0.05$.

3. Results

The study results revealed in [Table 1](#) that more than half (54%) of the studied patients, fall at the age group between 45 to less than 60 years old, and the mean age of patients under study was 51.55 ± 12.29 that. It was show that 60% of patients were males. Regarding marital status, it was revealed that, 75% of the studied patients were married, and 35% of them can't read and write. It was revealed that more than half (51%) of the study group are living in urban area and 94% of them are treated through state expense.

As shown in [Table 2](#), the results revealed that, more than two thirds of patients under study (69%) are not compliant to their therapeutic regimen of hemodialysis. While less than one third (31%) were compliant to their treatment.

Regarding overall level of compliance, [Table 3](#) showed that approximately one third (31%) of the studied patients undergoing hemodialysis had good compliance behavior to their therapeutic regimen, half of them (51%) had moderate compliance behavior and (18%) of patients had poor level of compliance to therapeutic regimen.

The results of the current study shows in [Table 4](#) that the descending ranking of total hemodialysis patient's compliance to treatment regimen clarified that the maximum score was for medication compliance followed by hemodialysis, then diet and fluid compliance came in the last of ranking with mean score (94.50 ± 11.0 , 74.83 ± 25.49 , 47.25 ± 13.25 , 46.25 ± 13.93) respectively.

Table 1. Demographic characteristics of the studied subjects (n=100).

Patients' characteristics	No	%
Age		
18- < 30	3	3.0
30- < 45	15	15.0
45- < 60	54	54.0
≥ 60	28	28.0
Gender		
Male	60	60.0
Female	40	40.0
Level of education		
Can't read and write	35	35.0
Read and write	53	53.0
Secondary education	12	12.0
Marital status		
Single	6	6.0
Married	75	75.0
Widow	15	15.0
Divorced	4	4.0
Occupation		
Not working	52	52.0
Manual work	19	19.0
House wife	29	29.0
Residence		
Rural	49	49.0
Urban	51	51.0
Medical services		
Health insurance	6	6.0
State expense	94	94.0

Table 2. Distribution of the studied patients regarding overall compliance (n = 100)

Overall Compliance	No	%
Compliant (≥ 1000)	31	31.0
Non-Compliant (700- < 1000)	69	69.0

Table 3. Distribution of the studied patients regarding level of overall compliance (n = 100)

Overall level of Compliance	No	%
Good Compliance ($\geq 1000 - 1200$)	31	31.0
Moderate Compliance (700- 999)	51	51.0
Poor Compliance (< 700)	18	18.0

Table 4. Ranking of studied patients total compliance with hemodialysis, medication, fluid and diet (n = 100)

Items	Mean \pm SD	Rank
Hemodialysis	74.83 ± 25.49	2
Medication	94.50 ± 11.0	1
Fluid	46.25 ± 13.93	4
Diet	47.25 ± 13.25	3
Overall compliance	73.19 ± 15.71	

Table 5. Frequency and percentage distributions of the studied patients regarding overall functional status (n=100)

Overall functional status	No	%
Fair functional status (50% - < 75%)	19	19.0
Poor functional status (< 50%)	81	81.0

By exploring the functional status of patients, the results in Table 5 show that majority of the patients under study (81%) had poor level of functional status and 19% of them had fair level. The results of this study show in Table 6 that there is a positive statistically significant correlation between physical function, bodily pain, general health, total physical health component, vitality, social function, total mental

health component and overall compliance ($p < 0.001$).

In relation to correlation between functional status and compliance among patients undergoing hemodialysis, Table 7 show that, there is a positive statistically significant correlation between cognitive function, finance, work, sleep, dialysis access, quality of life, total ESRD related domains and overall patients' compliance ($p < 0.001$).

Table 6. Correlation between functional status and compliance among patients undergoing hemodialysis (n = 100)

Domain		Hemodialysis	Medication	Fluid	Diet	Overall compliance
Physical function	r	0.417	0.162	0.250	0.245	0.445
	P	<0.001*	0.107	0.012*	0.014*	<0.001*
Role physical	r	--	--	--	--	--
	P	--	--	--	--	--
Bodily pain	r	0.368	0.251	0.192	0.207	0.401
	P	<0.001*	0.012*	0.056	0.038*	<0.001*
General health	r	0.383	0.198	0.264	0.216	0.419
	P	<0.001*	0.048*	0.008*	0.031*	<0.001*
Total physical health component score	r	0.441	0.191	0.266	0.256	0.473
	P	<0.001*	0.056	0.007*	0.010*	<0.001*
Vitality	r	0.275	0.184	0.148	0.114	0.293
	P	0.006*	0.067	0.142	0.259	0.003*
Social function	r	0.381	0.083	0.235	0.122	0.385
	P	<0.001*	0.411	0.019*	0.226	<0.001*
Role emotional	r	--	--	--	--	--
	P	--	--	--	--	--
Mental health	r	0.123	-0.042	0.293	0.220	0.176
	P	0.222	0.677	0.003*	0.028*	0.080
Total mental component score	r	0.316	0.087	0.282	0.190	0.348
	P	0.001*	0.391	0.005*	0.058	<0.001*

r: Pearson coefficient, Significant P <0.05*.

Table 7. Correlation between functional status and compliance among patients undergoing hemodialysis (n = 100) Cont.

Domain		Hemodialysis	Medication	Fluid	Diet	Overall compliance
Freedom	r	0.119	0.085	-0.077	0.102	0.113
	P	0.239	0.400	0.446	0.313	0.261
Travel	r	-0.044	0.203	0.038	0.048	0.0
	P	0.660	0.042*	0.709	0.633	1.000
Cognitive function	r	0.322*	0.202	0.221	0.252	0.366
	P	0.001*	0.044*	0.027*	0.011*	<0.001*
Finance	r	0.149	0.135	0.244	0.250	0.215
	P	0.140	0.181	0.015*	0.012*	0.031*
Diet	r	--	--	--	--	--
	P	--	--	--	--	--
Recreation	r	0.071	-0.091	0.103	0.098	0.079
	P	0.481	0.366	0.308	0.334	0.434
Work status	r	0.303*	0.214	0.160	0.157	0.329
	P	0.002*	0.033*	0.112	0.119	0.001*
Body image	r	0.014	0.293	0.085	0.100	0.075
	P	0.891	0.003*	0.398	0.321	0.459
Symptoms	r	0.487*	0.184	0.153	0.169	0.481
	P	<0.001*	0.067	0.128	0.093	<0.001*
Sexual activity	r	0.112	0.044	0.090	-0.017	0.106
	P	0.480	0.780	0.571	0.913	0.505
Sleep quality	r	0.226*	0.121	0.092	0.095	0.233
	P	0.024*	0.231	0.360	0.348	0.020*
Dialysis access	r	0.288*	0.216	0.213	0.304	0.346
	P	0.004*	0.031*	0.034*	0.002*	<0.001*
QoL	r	0.453*	0.185	0.274*	0.211	0.477
	P	<0.001*	0.065	0.006	0.035*	<0.001*
Total ESRD related domains	r	0.526*	0.265	0.205	0.222	0.539
	P	<0.001*	0.008*	0.041*	0.026*	<0.001*

r: Pearson coefficient, Significant P <0.05*.

4. Discussion

End stage renal disease is a worldwide public health problem due to its increased prevalence, high costs and mortality rate. Patients on dialysis deal with a painful long-term treatment and its complications, which impacts their functional status. Regarding therapeutic compliance, some factors may hinder compliance of these patients, such as therapeutic complexity, adverse reactions induced by the drugs [18].

Although hemodialysis may help patients with ESRD to maintain their physical function and prevent complications, it is difficult to cure ESRD with hemodialysis alone, and the disease requires continued treatment and care. Self-care for hemodialysis patients may require significant restrictions in lifestyle habits and behaviors, yet only about 50% of patients adhere to recommended self-care strategies [19]. Therefore, this study was carried out to determine the relation between therapeutic compliance and functional status of the patients undergoing hemodialysis.

The present study revealed that more than half of the studied subjects fall at age group between 45 to 60 years old. This may be due to that, the development of chronic kidney disease is insidious. Kidney disease often develops slowly, and many people don't realize they have it until the disease is advanced. Also risk factors such as diabetes and hypertension are often lately diagnosed at the population level, and consequently presentation with kidney disease is typically late. This result is consistent with Abozead, Ahmed and Mahmoud (2015) [20] who reported that, most participants' age was between 35 and 54 years old in the study that titled "Nutritional status and malnutrition prevalence among maintenance hemodialysis patients".

In the present study, three fifths of the studied patients were males. This finding goes in the same line with Chang et al., (2016) [21], who reported that, male patients showed a substantially higher prevalence of chronic kidney disease and incidence rate of ESRD than those observed in female patients and this is may be due to that men with diabetes and hypertension have a higher risk of nephropathy than women with diabetes and hypertension do because of the poorly controlled hypertension among males.

As regard to marital status, the current study revealed that, three quarters of the studied patients were married. This finding is consistent with Telles et al., (2014) [22], who reported that, more than two thirds of the studied patients were married (73.2%) in the study that titled "Socio-demographic, clinical and laboratory profile of patients submitted to hemodialysis".

Concerning educational level, the result indicates that, more than half of the studied patients can read and write. This finding may be due to that people with low educational level are at high risk for developing chronic diseases as a result of lack of knowledge. This result is consistent with Abozead et al., (2015) [20], who reported that, more than one third of the studied patients had held a primary school degree of education.

In relation to overall patients' compliance, the present study illustrated that, nearly half of the studied patients undergoing hemodialysis had moderate level of compliance to the therapeutic regimen and less than one

third of them had overall good level of compliance. The reason of non-compliance may be due to different believes of the patient about the effectiveness of the treatment, or may be due to lack of knowledge and education, or fear of unpleasant side effects or complications. This finding is contradicted with Al-Khattabi (2014) [23] who found that, 55.5% of the studied patients had good level of adherence to treatment plan, 40.5% had moderate adherence, and 4.1% of them had poor adherence behavior.

Concerning the relation between physical function and overall compliance, the present study revealed that, there was a positive statistically significant correlation between physical function and overall compliance. This may be due to that, patients undergoing hemodialysis usually complains of reduced muscle strength caused by muscle catabolism and wasting, increased cardiovascular risk in combination with a high prevalence of co- morbid disorders, both leading to a reduced health related quality of life and decreased physical fitness. This result is consistent with Gerogianniet al., (2014) [24] who showed that, there was a significant relation between physical function and patient's compliance in the study that titled "A structured exercise program during hemodialysis for patients with chronic kidney disease: clinical benefit and long-term adherence".

Concerning the relation between bodily pain and overall compliance, the present study showed that, there was a positive statistically significant correlation between bodily pain and overall compliance. This may be due to that more than half of patients complain of moderate pain which interfere with their normal work, activities, sleep, mood, functional status and affect overall their compliance to treatment regimen. This result goes in the same line with Tohme et al., (2017) [25] who stated that, factors independently associated with missing hemodialysis sessions include higher pain score.

Regarding the relation between general health and overall compliance, the present study revealed that, there was a positive statistically significant correlation between general health and overall compliance. This may be due to that more than half of patients had expressed fair level of health and they get somewhat worse than previous and this affects their compliance to therapeutic plan. This result was contradicted with Alves et al., (2018) [18] who showed that, there was no statistically significant relation between general health and compliance.

As regard to the relation between vitality and overall compliance, the present study illustrated that, there was a positive statistically significant correlation between vitality and overall compliance. This may be due to that nearly three quarters of patients feel worn out and tired due to dialysis, they feel that they didn't have energy to perform usual daily activities and they feel that nothing could cheer them up; all these factors affect their compliance. This result is contradicted with Karamanidou, Weinman and Horne (2014) [26] who showed that, there was no statistically significant relation between vitality and compliance in the study that titled "A qualitative study of treatment burden among hemodialysis recipients".

Regarding the relation between social function and overall compliance, the present study showed that, there was a positive statistically significant correlation between social function and overall compliance. This may be due to that, all patients stated that the presence of pain, effect

of dialysis on physical and emotional health interfere with their normal social activities with family and friends. Enhancing encouragement from family members is very important to support their patient and making him co-responsible for treatment and is considered the best way to fight patient absenteeism from dialysis sessions. This result is inconsistent with Calia et al., (2015) [27] who showed that, there was no statistically significant relation between social function and compliance.

The present study revealed that, there was no statistically significant correlation between mental health and overall compliance. This may be due to that majority of the patients expressed they didn't isolate themselves from people around them, didn't had difficulty in concentrating or thinking, and they never become confused toward thing. This result is disagreeing with Nabolsi, Wardam and Al-Halabi (2015) [28] who showed that, there was a positive statistically significant relation between mental health and compliance of patients on hemodialysis.

This study showed that, there was a positive statistically significant correlation between total mental health component and overall compliance. This may be due to that depression and poor mental health are associated with a higher risk for hospitalization and death in hemodialysis patients. Moreover, depressed hemodialysis patients are more likely to non adherence to dietary and fluid restrictions, and more liable to withdraw from dialysis therapy. This result is contradicted with García-Llana et al., (2013) [15] who showed that, there was no statistically significant relation between total mental health component and compliance.

In relation to travel, the result of this study showed that, there was no statistically significant correlation between travel and overall compliance. This result is contradicted with Urquhart-Secord et al., (2016) [29] who showed that there was a significant correlation between travel and overall compliance. This may be because travel leads to a better quality of life and had better impact on mental and physical well-being.

As regard to cognitive function, the study illustrated that, there was a positive statistically significant correlation between cognitive function and overall compliance. This may be due to that most of patients stated that they understand that missing of hemodialysis sessions might impact clinical conditions and lead to more marked cognitive impairment, so that they are more adhere to dialysis sessions. This result is similar to Nabolsi et al., (2015) [28] who reported that, there was a significant correlation between cognitive function and overall compliance.

The study also showed that, there was a positive statistically significant correlation between finance and overall compliance. This may be due to that most of patients under study are receiving treatment on state expense because dialysis treatment is an expensive and this is likely the most common cause of compliance of ESRD patients to hemodialysis sessions. This result is consistent with Chan, Zalilah and Hii (2012) [30] who showed that; there was a significant correlation between finance and overall compliance in the study that titled "Determinants of compliance behaviors among patients undergoing hemodialysis in Malaysia".

Regarding recreation, this study reported that, there was no statistically significant correlation between recreation and overall compliance. This reflect that patients under study didn't understand the importance of recreation on physical, social, mental and emotional well-being; and low leisure-time activity is a significant risk factor for higher morbidity, lower survival and lower adherence. This result is contradicted with Rosa et al., (2015) [31] who had a study showed that; there was a significant correlation between recreation and overall compliance.

In relation to work, this study reflected that there was a positive statistically significant correlation between work and overall compliance. This may be due to more than half of the patients had no work and all of them were limited in the kind of the work they do and had difficulty in performing it. This result is contradicted with Ibrahim, Hossam and Belal (2015) [32] who had a study showed that there was no statistically significant correlation between work and overall compliance.

This study showed that, there was no statistically significant correlation between body image and overall compliance. This result is consistent with Polikandrioti et al., (2017) [33] who reported that there was no statistically significant correlation between body image and overall compliance. This may be due to that, the majority of patients who missed or had shortened dialysis were young patients who had been on dialysis for less than a year.

Concerning symptoms, the study revealed that there was a positive statistically significant correlation between somatic symptoms and overall compliance. This explains that overall symptom burden may have a negative impact on the perceived functional status of patients with ESRD. This result goes in the same line with Raj, et al (2017) [34] who stated that there was a significant correlation between symptoms and overall compliance.

The study reported that, there was a positive statistically significant correlation between sexual activity and overall compliance. This may be due to that depression and anxiety may be the presenting symptoms of sexual dysfunction. A satisfactory sexual life makes the patient feel less anxious and depressive and evaluate his/her status of general health more favorably, and it also associated with less absenteeism from dialysis sessions. This result is in agreement with Tamie, Gorayeb and Costa (2016) [35] who illustrated that there was a significant correlation between sexual score and overall compliance.

Regarding sleep, this study showed that there was a positive statistically significant correlation between sleep and overall compliance. This may be due that most of patients reported that they get the amount of sleep they need most of the time and didn't awake during the night which affects them positively in their compliance to treatment. Another potential reason for this is that hemodialysis patients with good sleep quality tend to be living properly regulated lives, which means that they are perhaps more likely to properly regulate their medication administration as well. This result is similar to Liaveri et al., (2017) [36] who revealed that there was a significant correlation between sleep and overall compliance.

In relation to dialysis access, this study showed that there was a positive statistically significant correlation between hemodialysis access and overall compliance. This

may be due to that problems with hemodialysis vascular access associated with poor dialysis sessions adherence. This result is consistent with Polikandrioti et al., (2017) [33] who reported that; there was a significant correlation between hemodialysis vascular access and overall compliance.

It was shown that, there was a positive statistically significant correlation between quality of life and overall compliance. This may be due to that poor social support and other psychosocial factors that result in high mortality risk, lower adherence to medical care, and poor physical quality of life for patients undergoing hemodialysis. This result goes in the same line with Naderifar et al., (2018) who showed that; there was a significant correlation between quality of life and overall compliance.

Finally, this study showed that, there was a positive statistically significant correlation between overall functional status and overall compliance which answer the third question of the study. This may be due to that abuse of dietary (diet and fluid) restrictions can result in a buildup of toxic fluids and metabolic end products in the blood stream which may lead to cardiovascular problems, uremic symptomatology and even death. This result is consistent with Ibrahim et al., (2015) [32] who had a study showed that; there was a significant correlation between overall functional status and overall compliance.

5. Conclusion

- The study concluded that more than two thirds of patients under study are not compliant to their therapeutic regimen. While less than one third were compliant to their treatment.
- Majority of the studied patients undergoing hemodialysis had poor level of functional status and about one fifth of them had fair level.
- There was a positive statistically significant correlation between overall functional status of patients undergoing hemodialysis and overall compliance with the therapeutic regimen.

6. Recommendations

- According to the results of the current study, it is recommended to design simplified and illustrated educational booklet about therapeutic compliance and self care practices for patients undergoing hemodialysis.
- Establish periodical educational program for nurses to improve their knowledge and practice regarding functional status and therapeutic compliance for patients undergoing hemodialysis to help patient to more adhere to their treatment plan.

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