Hemodialysis-Induced Anemia: Impact of a Nurse-Led Intervention on Health-Related Quality of Life

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Abstract:

Background. *Chronic Renal Failure (CRF) is a widespread medical problem commonly accompanied by hypo-proliferative anemia (renal anemia) due to erythropoietin deficiency. Anemia greatly contributes to the reduced Health-related Quality of Life (Hr-QoL). This study aims to evaluate the patients with hemodialysis-induced anemia and the impact of a nurse-led intervention on health-related quality of life.*
Materials & Methods: *Quasi-experiment design was used in carrying out this study.*
Setting: *The study was conducted at the renal dialysis unit at Ain Shams University Hospitals (El Demerdash Hospital), Cairo, Egypt.* **Subjects:** *select patients undergoing hemodialysis with selected criteria.* **Tools: (1) Structured Interview Questionnaire for Hemodialysis;** *it included (a) Socio-demographic characteristics of patient; (b) Patient assessment to determine patient's history (past, present, surgical and family) as well as hemodialysis. (c) Patient assessment sheet to assess anemia;* **(2) Kidney Diseases and Quality of Life (KDQOL TM- 36).** *The Kidney Disease Quality of Life (KDQOL) survey is a kidney disease-specific measure of Hr-QoL* **(3) Patient's Assessment knowledge Questionnaire;** *included "dialysis, anemia, and complications".* **Results:** *there were statistical significance related to level of Hgb, WBC and ferritin level. As regards patient's Hr-QoL pre and post-study, it resulted that highly statistical significance related to physical and mental component summary while no statistical significance related to burden of kidney disease, symptoms and problem, effects of kidney disease on patient's daily life. There was highly statistically significance difference according to patient's knowledge after a nurse-led intervention, no correlation between Hr-QoL and patient's knowledge.*
Conclusion: *A Nurse-led intervention seems effective to improve some parameters of Hr-QoL for hemodialysis – induced anemia patients as a physical and mental component summary. There are highly statically significant related to the satisfactory patient's knowledge.*
Recommendation: *Application and generalization for nurse-led intervention as Arabic booklet instruction for the new patient with hemodialysis*
Keywords: *Hr-QoL, Nurse-Led Intervention, Hemodialysis, Anemia.*

I. Introduction

The most common clinical problem associated with chronic renal failure is a reduction in the erythrocyte count, hemoglobin, and hematocrit (anemia). When serum Creatinine levels reach 3.0mg/dl, most patients will understanding a degree of anemia, and when dialysis is started, the majority of patients have anemia unless they are being treated with erythropoietin (Epo). Indeed, several of the clinical manifestations of uremia appear to be related in part to anemia. Improvement of anemia usually improves tiredness, appetite, and quality of life. [1]

Chronic kidney disease (CKD) is a recurrent, worldwide disorder, and the number of patients affected continues to increase 30 million American adults have CKD and millions of others elevate risk. Early discovery can help prevent the progress of kidney disease to kidney failure and the need for renal replacement therapy (hemodialysis, peritoneal dialysis, or renal transplantation)[2].

Practically all patients suffering from chronic renal failure (CRF) eventually become anemic. The condition is termed ''anemia associated with CRF'' or simply ''renal anemia''. Although multi-factorial in nature, the major etiological factor of this normochromic normocytic anemia is erythropoietin (Epo) deficiency: considering the level of anemia, CRF patients have improperly low serum Epo levels due to eliminated Epo gene expression in the kidney [3].

Anemia defined as a deficiency of red blood cells or hemoglobin in the circulating blood, resulting in reduced oxygenation of body tissues and organs. Normal hematocrit and hemoglobin levels vary allowing to age, sex, race, among other factors. The World Health Organization (WHO); defines anemia as hemoglobin < 13g/dL for men and postmenopausal women and < 12g/dL for premenopausal women. It is estimated that up to

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90% of patients have chronic renal failure (CRF) and glomerular filtration rate < 30-25 mL/min will develop anemia. [4] [5].

Anemia occurs early progress of kidney disease and deteriorates with declining kidney function. Many researches have confirmed an association between the hemoglobin (Hgb) concentration and kidney function [6].

Presence of anemia should be systematically assessed in CRF patients, especially in patients with signs/symptoms such as fatigue, dyspnea, pallor of mucous membranes, and tachycardia among others. Complete clinical evaluation should be performed to rule out other causes of anemia. Laboratory assessment should include Complete Blood Count (CBC) and measurements of serum ferritin and transferrin saturation. The need for additional tests for the differential diagnosis of other diseases associated with anemia will depend on the results of individual clinical assessments. [7]

A major enhancement in the treatment of anemia occurred with the cloning of the human gene for erythropoietin in 1983 and the demonstration of the efficacy of recombinant human erythropoietin treatment in dialysis patients in 1986. Previously, patients with erythropoietin-associated anemia required blood transfusions when they became symptomatic, despite concerns about transfusion safety. Currently, erythropoietin-associated anemia can be titrated to near-normal hemoglobin concentrations. [8]

Anemia dramatically reduces exercise patience, cognitive abilities, appetite and a number of other features of daily living subsumed within the model of Health-related Quality of Life (Hr-QoL). The only clinically significant way of treating renal anemia is improve the signal that committed erythroid progenitors to take from the erythropoietin receptor (Epo-R). This signal promotes their survival and differentiation resulting in correction of anemia [9] [3]

The prevalence rates of CKD worldwide are high and have increased in the last few years to about 13–15%, with an increased prevalence of diabetes and hypertension. In Egypt, the assessed annual incidence of ESRD is around 74 per million and total prevalence of patients with dialysis is 264 per million [10].

Health-related Quality of Life (Hr-QoL) refers to gathering of subjective and objective experiences among which health, well-being and the ability to function in activities of daily living are essential. Hr-QoL instruments provide to assess the impact of the disease, effect of treatment and other variables affecting people's lives.[11]

Dialysis treatment results in prolongation of life for most patients. However, patients on dialysis face limited survival combined with a considerable loss of Hr-QoL. In addition to this dialysis treatment generates important burden on daily life in terms of chores to be completed, the time taken to obtain dialysis, the expense of treatment and hospitalization for surgical procedures or complications. QoL is greatly influenced by Hr-QoL, and is probably just as, if not a more important determinant of successful treatment as is survival. [12]

Quality of life (QoL) can be defined in many ways, making its measurement and integration into scientific study difficult. As illness and its treatment affect the psychological, social and economic well- being, as well as the biological integrity of individuals, any definition should be comprehensive while allowing individual components to be outlined. This allows the impact of different disease interventions on overall or specific aspects of QoL to be determined health professional, especially nurses, can play a key role in the evaluation of QoL in hemodialysis (HD) patients. [13]

The nurse who works in the renal replacement therapy unit, who is able to coordinate the assistance delivered from the identification of the needs manifested by the person undergoing hemodialysis is required to providing means of care that aim at better treatment competence, confirming quality of life and taking advantage of every moment to create conditions for change.[14]

The nurse-led intervention plays an essential role in teaching the patient with ESRD, because of the extensive teaching need, the home care nurse, dialysis nurse and nurses in hospital and outpatient setting all provide ongoing education and reinforcement while monitoring the patient's progress and complications with the treatment regimen [15]. The nurse in the dialysis unit has an significant role in monitoring, supporting, assessing and education the patient [16].

The magnitude of the problem: Health-related Quality of Life (Hr-QoL) refers to the measure of a patient's functioning, well-being, and general health perception in each of three domains: physical, psychological, and social. Along with survival and other types of clinical outcomes, patient quality of life (QoL) is an important indicator of the effectiveness of the medical care they receive. QoL of patients with end-stage renal disease (ESRD) is influenced by the disease itself and by the type of replacement therapy. Many studies have recognized the effect of such factors as anemia, age, comorbidity, and depression on QoL. [17]

Aim of the study:
This study aims to evaluate the patient with hemodialysis-induced anemia and identify the impact of a nurse-led intervention on health-related quality of life.

Research Question

What is the impact of a nurse-led intervention for the patients with hemodialysis- induced anemia on their health-related quality of life?

What is the relationship between pre and post patient's knowledge and health-related quality of life?

II. Material And Methods

It involved a description of the research design, settings, study subjects and sampling, and data collection tools.

Research Design: Quasi-experiment design was used in carrying out this study.

Setting: The study was conducted at the renal dialysis unit at Ain Shams University Hospitals (El Demerdash Hospital), Cairo, Egypt.

Subjects & selection method: A purposive sample of 45 patients undergoing hemodialysis were recruited after their acceptance to participate in the study. Participants for the study were selected based on the inclusion and exclusion criteria, the inclusion criteria included, patients start hemodialysis from one year ago, their ages above 18 years old. While patients undergoing continuous renal replacement therapies, those who cannot complete a KDQOL-36 due to cognitive impairment, dementia, and active psychosis, patients had the infectious disease as hepatitis C were excluded from the study.

Sample size calculation: A purposive sample of 45 based on power analysis. A Power of .95 (B = 1-.95 = .5) at alpha .05 (one-sided) with medium effect size (0.3) was used as the significance level because these levels have been suggested for use in the most areas of research.

Data collection tools:

I.   Structured Interview Questionnaire for Hemodialysis; it is constructed by the researchers after reviewing the literature [18] It includes

1.1 Sociodemographic characteristics of the patient such as (age, sex, educational level, and married state).

1.2 Patient assessment to determine patient's history (past, present, surgical and family) as well as hemodialysis.

1.3 Patient assessment sheet about Anemia; to assess patient's state about anemia. It includes management, and lab investigation as Hgb, WBC, RBC, and ferritin to assess the level of anemia for the patient with hemodialysis.

II. Kidney Diseases and Quality of Life (KDQOL TM- 36). The Kidney Disease Quality of Life (KDQOL) survey is a kidney disease-specific measure of Hr-QoL. The first version contained the Medical Outcomes Study 36 (MOS SF-36) as a generic chronic disease core, plus items relevant to patients with kidney disease, such as symptoms, the burden of illness, social interaction, staff encouragement, and patient satisfaction. Quote from [19] The KDQOL-36, available since 2002, is a reliable and valid 36-item Hr-QoL survey with four subscales: 1) items 1-12: SF-12 physical component summary (PCS) includes,{physical functioning role physical, bodily pain, and general pain}, and mental component summary (MCS) includes {vitality, social function, role emotional and mental health}; 2) Burden of kidney disease subscale (items 13-16) includes items{interference with daily life, time to deal with kidney disease, frustration, feeling like a burden}; 3) symptoms and problem subscale (items 17 -28) includes items {general health, activity limits, ability to accomplish desired tasks, depression/anxiety, energy level, social activities}; 4) effects of kidney disease on daily life subscale (items 29 -36) includes items {impact of fluid &diet limits, ability to work around the house/travel, feeling depending on medical team, stress or worries, sex life, personal appearance} [20]. It translates by researcher and review by 7 members from jury medical and nursing staff. The reliability test was done whereas Cronbach's Alpha equal 0.790 "0.7" for high internal consistency. In this case, α = .790, which shows the questionnaire is reliable" Done pre-study and follow-up after six months, used mean compere using paired t-test (SPSS).

III. Patient's Assessment knowledge Questionnaire: it is developed by the researchers after reviewing the literature based on instructions booklet. It applied pre/ post –test for nurse-led intervention. It includes 26 questions there are categories to parts (dialysis & ESRD diseases, anemia associated dialysis, the complications of hemodialysis) as choices, true and false. Total score 26 points for patient's knowledge (less than 50% from total score consider unsatisfactory and more than or equal 50% from total score consider satisfactory) Reliability test were done where as Cronbach's Alpha equal 0.802

Pilot study: A pilot study was conducted to test the feasibility and applicability of tools and maneuvers of the interventions, and to estimate the time-consuming. It was conducted on 5 patients; these patients were dismissed from the study.

Ethical consideration of the study: Oral informed permissions were secured from each subject to contribute after explanation the nature, purpose, and benefits of the study. Subjects have the right to withdraw from the study any time, or withhold any information

Study maneuver:
- Data collection period 12 months was started from May 2017 to April 2018.
- Date was collected through morning shift.
- Interview with the patient pre-session of hemodialysis or post-session according to patient's condition.
- Filling structured interview questionnaire included socio-demographic characteristics and patient assessment sheet to collected past and present history during an interview in 20: 30 minutes.
- Review patient file to obtain lab investigation for the patient include (Hgb, WBC, RBC, and ferritin) and collected lab investigation for anemia within 2, 4, 6 months.
- Design and develop illustrated instruction booklet about "dialysis & ESRD diseases, anemia associated dialysis, the complications of hemodialysis and Hr- QoL"
- Explain the instruction booklet through patient's class includes 2-3 patients pre or after dialysis session within 15 minute and repeated according to patient's condition until completed the instruction.
- Hemodialysis patient's knowledge done pre and post-test for nurse-led intervention for patient beside on instruction booklet, for illiterate patient it was filled by the researcher.
- Patient during hemodialysis session filling KDQOL questionnaire within 15: 20 minute done pre-study and follow up for the quality of life done after 6 months by interview, the researcher filling it with the illiterate patient.

Statistical design: Data statistical analysis were done using "SPSS 16.0 statistical software package". Results were presented as the frequencies, percentage, and Pearson correlation analysis to test the statistical significance of some variables and to test the effectiveness of the nurse-led interventions. Statistical significance was considered at p-value < 0.05.

III. Results

Table (1): Socio-demographic data for the patients undergoing hemodialysis.

Items	Total N= 45	%

Age :
    Minimum = 20.00
    Maximum = 87.00
	Mean±SD 52.84± 13.81	

Sex : • Female • Male	23 22	51.1 48.9
Marital status: • Married • Widowed • Single	37 3 5	82.2 6.7 11.1
Education level: • Illiterate & Primary • Secondary • Undergraduate • Postgraduate	28 11 5 1	62.2 24.4 11.1 2.2

Table (1) Socio-demographic data for the patients undergoing hemodialysis, It shows that mean of age 52.84, while a minimum & maximum of age was 20 to 87 year. As regard to sex, the female was present (51.1%); regarding to marital status, the majority of subjects were married (82.2%). While as regards the level of education, illiterate patients & primary represent 62.2% of the study sample.

Table (2): Past, surgical and family history for patient's undergoing hemodialysis.

Items	Total N= 45	%
Suffering from medical problems ▪ Yes ▪ No	39 6	86.7 13.3
*If yes: (N: 39) ▪ Diabetes Mellitus ▪ Hypertension ▪ Cardiac disorders (CAD) ▪ Allergy disorder	18 31 1 1	46.2 79.5 2.6 2.6
Surgical history ▪ Yes ▪ No	4 41	8.9 91.1
Family history for ESRD		

▪	Yes	2	4.4
▪	No	43	95.6

* Answers are not mutually exclusive

Table (2) shows the past, surgical and family history for patient's undergoing hemodialysis. It was found that the majority (86.7%) of the patients suffering from medical problems such as hypertension (79.5%) and DM 46.5% while no surgical or family history (91.1%, 95.6%) respectively.

Table (3): Present history (regarding to dialysis) for patient's undergoing hemodialysis.

Items	Total N= 45	%
Cause of hemodialysis:		
• ESRD	38	84.4
• Other	3	6.7
• ESRD with other causes	4	8.9
Vascular access		
• Shunt	37	82.2
• CVL	8	17.8
A frequency of hemodialysis per week;		
• 2 session	12	26.7
• 3 session	32	71.7
• 4 session	1	2.2
Duration of dialysis session per hours:		
• Three hours	23	51.1
• Four hours	22	48.9
*Adverse intra-dialysis symptoms:		
• Nothing	10	22.2
• Cramping	28	62.2
• Nausea	7	15.5
• Hypertension	13	28.9
• Hypotension	6	13.3
Administration anticoagulation med. during the session (heparin dose).		
• ≥500 u to <1000 u	9	20.0
• ≥ 1000 u to ≥2000 u	35	77.8
• More than 2000 u	1	2.2
Administration anticoagulation medication at home.		
• Yes	37	82.2
• No	8	17.8

Table (3) illustrates the present history for the patient's undergoing hemodialysis. It was found that cause for hemodialysis the majority (84.4%) was ESRD. The highest percentage (82.2%) of them had a shunt for vascular access. Less than three quarters of patients (71.7%) received 3 sessions for hemodialysis per-week within three hours (51.1%) for each. As regards, adverse intra-dialysis symptoms; cramping and hypertension were reported 62.2% and 28.9% of patients respectively. Regarding administration anticoagulation medication, the results of this study revealed that 77.8% of the total samples take it during the session while the majority of them (82.2%) received it at home.

Table (4): Evaluation of current health status for patient's undergoing hemodialysis.

Items	Total N= 45	%
Fluid status		
• Overweight	18	40.0
• Underweight	4	8.9
• At target weight	23	51.1
Neck veins:		
• Distention	15	3.3
• Flat	3	66.7
Peripheral		
• Edema	7	15.0
• Perfusion (normal capillary refill)	29	64.4
• Lack of skin turgor	9	20.0
Physical limitation		
• Yes	28	62.2
• No	17	37.8

Table (4) demonstrates the evaluation of current health status for patient's undergoing hemodialysis more than half (51.1%) of studied patients were at target weight, while 66.7% have flat neck vein and 64.4% of them with normal peripheral perfusion

Table (5): Management of anemia for patient's undergoing hemodialysis.

Items	Total N= 45	%
Recent blood transfusion:		
• Yes	5	11.1
• No	40	88.9
*Given ESA medicines		
• Yes	39	86.7
• No	6	13.3
If yes:		
monthly	19	48.7
Weekly	20	51.3
Given iron medication		
• None	28	62.2
• weekly	14	31.1
• Monthly	3	6.7
Given Vit D		
• Yes	36	80.0
• No	9	20.0

*ESA: Erythropoiesis Stimulating Agent.

Table (5) bring to management of anemia for patients undergoing hemodialysis, the majority of the study sample haven't recent blood transfusion (88.9%) and 86.7% of them were given ESA medicine (51.3% weekly and 48.7% monthly); while for Vit. D; it was taken by (80.0%) of the total sample.

Table (6): Evaluation of anemia for patient's undergoing hemodialysis.

Items	2nd-months Mean ±SD	4th-months Mean ± SD	6th-months Mean ±SD	X2	P-value	Sign.
Level of Hgb	11.506 1.855	11.115 1.596	10.846 1.916	7.686	0.021	S
Level of WBC	10.403 12.873	8.205 8.812	7.885 9.647	6.206	0.045	S
Level of RBC	3.977 0.635	3.966 0.676	4.126 1.402	0.483	0.785	NS
Ferritin level:	8.079 385.4	6.902 460.54	5.419 558.5	6.943	0.031	S

Table (6) elucidated evaluation of anemia for patient's undergoing hemodialysis through six months, there is statistical significance related to the level of Hgb, WBC and ferritin level.

Table (7): Comparison the patient's health-related quality of life pre nurse-led interventions and after 6months.

Items	Pre-study Mean ± SD	Post-study (6th month) Mean ± SD	T-Test	P	Sign.
Physical and mental component summary	16.088 4.445	24.022 4.340	-8.595	HS	0.000
The burden of kidney disease	11.288 5.879	11.333 3.190	-0.47	NS	0.963
Symptoms and problem	31.244 13.345	27.488 5.918	1.617	NS	0.113
Effects of Kidney Disease on patient's Daily Life	19.511 9.771	20.644 3.879	-0.712	NS	0.480
Total of quality of life	78.133 18.706	83.488 9.866	-1.716	NS	0.093

Table (7) shows compare between patient's quality of life pre nurse-led interventions and after 6 months, the results offer that there was highly statistical significance related to physical and mental component summary while no statistical significance related to burden of kidney disease, symptoms and problem; and effects of kidney disease on patient's daily life.

Fig. (1): Comparison the assessment of patient's knowledge pre and post nurse-led interventions.
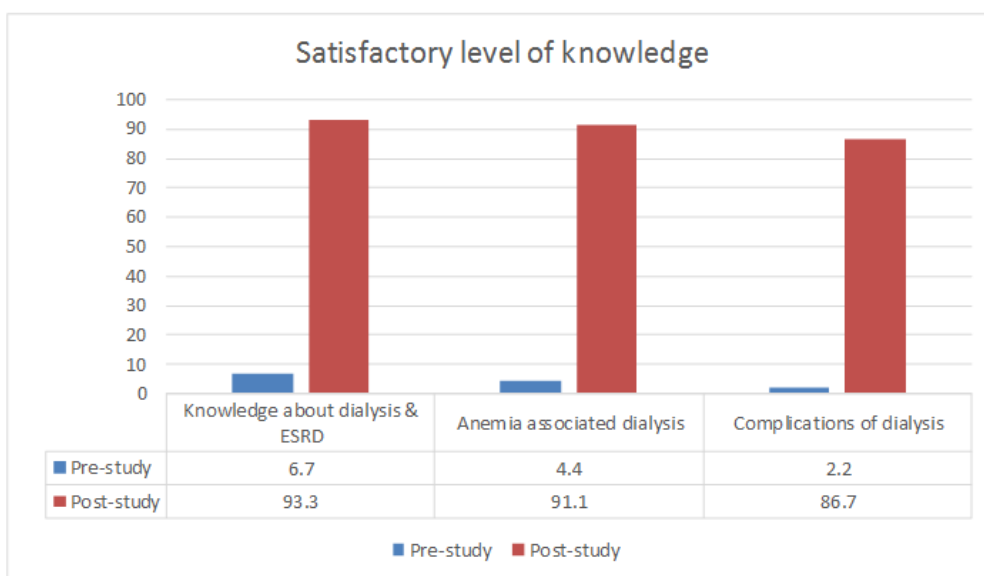

Fig. (1): shows that highly statistical significance related to patient's knowledge regards dialysis and ESRD, anemia associated dialysis and complications of dialysis in pre and post-study.

Table (8): The correlation between the patient's knowledge and Hr-QoL in pre and post- nurse-led intervention.

Items	Total patient's knowledge Pre-study	Total patient's knowledge Post-study (6th-months)
Total health-related quality of life pre-study	R= -0.078- P >0.05 (NS)	R= 0.054 P >0.05 (NS)
Total health-related quality of life follow-up (6th-month)	R= -0.128- P >0.05 (NS)	R= -0.016 P >0.05 (NS)

Table (8) shows the correlation between the patient's knowledge and Hr-QoL in pre and post-study, display that there was no statistical significance between them.

Table (9): the correlation between the patient's knowledge and Hr-QoL in pre and post-study with a level of Hgb.

Items	Hgb level 1 2nd months	Hgb level 2 4th months	Hgb level 3 6th months
Total patient's knowledge Post study	R= 0.210- P >0.05 (NS)	R= 0.342 P <0.05 (S)	R= 0.127 P > 0.05 (NS)
Total health related quality of life follow-up	R= 0.140 P >0.05 (NS)	R= 0.122 P >0.05 (NS)	R= 0.101 P > 0.05 (NS)

Table (9) bring to light that there was no statistical significance between the patient's knowledge and Hr-QoL in pre and post study with a level of Hgb, except total patient's knowledge post study with Hgb level 2 was statistically significance.

IV. Discussion

Nurses play a significant role in HD; they contributed to the preventive, promotive, and curative aspects of the dialysis unit [21] They are the most prevalent workforce in hemodialysis centers and have the major role in the day-to-day patient care and management [22]Therefore, nephrology nurses can have an impact in facilitating and encouraging people on hemodialysis to maintain their physical and psychological health [23] [24]

In studies which examine the impact of a nurse-led intervention on health-related quality of life in HD patients induced anemia; the nurse-led intervention is constructive for raising dialysis compliance, providing evidence of the need to improve nursing care for ESRD patients administered with dialysis in daily clinical practice [25].

Findings of this study revealed that the mean age & standard deviation of the studied group was 52.84± 13.81 years. This finding agreed with [26] mentioned that the mean age & standard deviation of hemodialysis patients was 54.4 ± 17.1 years.

In the current study, female patients represent slightly more than half of the sample. This finding was in agreement with [27] found that age group–specific hospitalizations with maintenance hemodialysis rates were consistently higher for women than for men.

In relative to the marital status of the patients under study, the findings of the current study revealed that the majority of them were married. This result was in agreement with [28] stated that approximately two-thirds of hemodialysis patients in his study were married.

Regarding the education of the patients, the end result of the present study exposed that nearly two thirds were illiterate & primary and the lowest percentage was postgraduate. This finding in accordance with [29] mentioned that more than half of hemodialysis patients in his study were illiterate or elementary education. This might be due to education which increases the patient's awareness of a healthy lifestyle.

In the present study, the majority of patients had medical problems and more than three-quarters of them had hypertension and less than half of them had DM. This finding agreed with [30] found that the most common causes of ESRD for Egyptian chronic hemodialysis patients were hypertensive nephropathy, while [31] stated that diabetes was the leading cause of hemodialysis.

Concerning the family history of ESRD, less than one-tenth of patients had ESRD history in the family. This finding is not corresponding with [32] stated that a positive family history of kidney disease in Ireland was reported in one-third of participants.

In the present study majority of hemodialysis patients had ESRD. This finding supported by [33] mentioned that patients need dialysis when they develop end-stage kidney failure

In relation to vascular access, the majority of patients had shunt as vascular access for hemodialysis. This finding agreed with [34] stated that one important step before starting hemodialysis patient is having minor surgery to create vascular access to allow his blood to flow from and return to his body during dialysis

The present study shows that, less than three-quarters of patients under study undergoing hemodialysis (HD) three sessions a week and more than half of them, the dialysis sessions last three hours. This finding was agreed with [16] found that most patients receive intermittent hemodialysis that involves treatments three times a week with the average treatment duration of 3 to 4 hours in an outpatient setting.

Concerning adverse intra-dialysis symptoms, more than three-fifths of patients under study had cramping and more than one-tenth of them had hypotension during hemodialysis which agreeing with [35] found that one-third of hemodialysis patients in his study had hypotension and less than one-tenth of them had cramps. On the contrary [36] The results also showed that increasing time and frequency of dialysis, blood flow rates, low recirculation percentages, reduction of intra-dialytic complaints.

In the present study two fifths of patients had overweight before the secession of dialysis. This finding agreed with [37] found that fluid overload is associated with higher mortality in dialysis patients. The present study appears two-thirds from patients with normal peripheral perfusion. This finding agreed with [38] found that early detection of peripheral vascular diseases and prompt initiation of therapy to prevent its progression in the HD population would improve Hr-QoL and survival outcomes remain to be proven.

The current study results revealed that there was a statistically significant difference in relation to the three phases of hemoglobin level assessment among the study group, which might be attributed to the nurse-led intervention. This finding was supported by [39] stated that a nurse working on a protocol and administering patient education on disease management for patients undergoing hemodialysis showed improved hemoglobin level.

The current study result revealed that there was a statistically significant difference in relation to three phases of the ferritin level assessment among the study group, This finding was supported by [40] mentioned that The ferritin level of peritoneal dialysis (PD) was lower than in patients on HD, and remained so despite improvement of Hgb level and erythropoiesis-stimulating agents (ESA) therapy.

The present study results show that majority of patients taken ESA. This finding was supported by [15] found that ESA anemia associated with Chronic Kidney Disease CKD may be treated pharmacologically by the administration of recombinant human erythropoietin and [41] reported that implementation of the individualized ESA dose algorithm facilitates improvement in Hgb maintenance within a target, decreases Hgb variability and reduces the dose of ESA required to achieve Hgb target.

In relation to health-related quality of life (Hr-QoL), the present study reported that there was highly statistically significant difference among the study group and follow up of Hr-QoL regarding physical and mental component summary. The patients after the nurse-led intervention became more knowledgeable and his hemoglobin level was improved. This finding was supported by [42] [43] stated that nurse-led management improved the quality of life in terms of symptoms, sleep, staff encouragement, pain, general health perception, energy or fatigue, overall health, and mental component summary.

As regards mental component, there was highly statistically significant difference in pre/post-nurse-led intervention among the study group. This might be due to nurse-led intervention which improve the level of hemoglobin and therefore improve mental health. This finding was parallel with [43] mentioned that nurse-led

disease management improved the quality of life in overall health and mental component summary when evaluated 6 weeks after the beginning of the intervention; also according to [44]. This intervention significantly alleviated depressive symptoms, reduced perceived role limitation due to emotional problems and improved the overall mental health component of quality of life in patients on maintenance hemodialysis.

In relation to Hr-QoL included the burden of kidney disease, the present study result documented that, there was no statistically significant difference among the study group. This result support by [45] reported that the Hr-QoL was low but not significantly different between HD and PD patients.

In relation to symptoms and problem based on the health-related quality of life, the present study result documented that, there was no statistically significant difference among the study group pre/post-nurse-led intervention in follow up after 6month. These findings were not similar to [46] found statistically significant effects for symptom/problem, work status, patient satisfaction and energy/fatigue in kidney disease quality of life short form for patients with chronic kidney disease who receiving post-discharge nurse-led telephone supportive care and [47] confirmed the presence of high symptom burden in dialysis patients in Uruguay. Several symptom clusters were identified as having a significant impact on the patients' well-being.

In relation to effects of kidney disease on patient's daily life on Hr-QoL the present study result documented that, there was no statistically significant difference among the study group pre/post nurse-led intervention in follow up after 6month, results are not agreed with [48] stated that the patients usually seek to find a new balance in the new conditions, by trying to tune together their needs, desires, and abilities, in order to achieve a normal life and feel secure. If the patients are encouraged to seek information, participate in decision-making procedures and have satisfactory care, then those factors can have a positive effect on their daily life and their life expectancy. This finding wasn't accordance with [49] added that nurse-led clinic led to improved self-care ability for patients with advanced renal failure and has also provided an opportunity for increased medical control and prevention which reflected on their health and the influence of the disease on everyday life.

As regarding the total of Hr-QoL in the present study show no significant between pre and follow up, this results not agreed with [50] [51] stated that dialysis adequacy was significantly associated with Hr-QoL in hemodialysis patients

As regards patients' knowledge assessment, the present study finding revealed that there was a highly statistically significant difference in patients' knowledge between pre /post nurse-led intervention. The present study results also indicated that most of the patients had satisfactory knowledge after the nurse-led intervention. This finding was supported by [42] reported that educational intervention can improve knowledge among hemodialysis patients; also this finding is corresponding with [52] stated that hemodialysis patients who received two educational methods were significantly increased regard to knowledge score before and after the intervention, and [25] found that nurse-led intervention is significantly higher compliance with dialysis than in standard care, evidenced that different intervention strategies, including educational, cognitive, and behavioral approaches.

In relation to correlation between patient's knowledge, and following up of Hgb, the present study reported that there was statistically significant difference among the study group (Hgb level 2). This result as agree with [43] found that the nurse-led disease management program seems effective to improve some parameters of quality of life for patients with chronic kidney disease.

V. Conclusion

According to the results of the present study showed that nurse-led intervention seems effective to improve some parameters of Hr-QoL for hemodialysis – induced anemia patients as physical and mental component summary with highly statically significant while no statically significant related to the burden of kidney disease, symptoms & problem, and effect of kidney disease on patient's daily life. The results show statically significant related to improve the anemia level through 6 months include the level of Hgb, WBC and ferritin. There are highly statically significant related to the satisfactory patient's knowledge regarding knowledge about dialysis, anemia, and complications of dialysis. The results also showed no correlation between patient's knowledge and Hr-QoL pre and post nurse-led intervention.

VI. Recommendation

- Application and generalization for nurse-led intervention as Arabic booklet instruction for patients on hemodialysis.
- Confirmed the results through well-designed large-scale prospective randomized controlled trials.
- Orientation program by different educational and learning methods for the patient with hemodialysis.

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