Research Article

Comparative Study in Clinical Signs and Symptom Burden in Hemodialysis Patients Before and After 5 years Duration in Minia University Hospital

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Abstract

Background: End-stage renal disease (ESRD) is a series of biochemical, clinical and metabolic disorders that are directly or indirectly associated with high rates of symptom burden. Glomerular filtration rate <15 ml/min/1.73 m2 means kidney failure which treated by renal replacement therapy (RRT) (either dialysis or transplantation) . Hemodialysis initiated urgently in patients with uremic encephalopathy, pericarditis, life-threatening hyperkalemia, refractory acidosis and hypervolemia (pulmonary edema). **Aim of the work:** comparison between hemodialysis patients' symptoms as regard duration of dialysis. **Patients and methods:** This descriptive cross-sectional study was conducted at the hemodialysis unit in Minia university Hospital on 100 hemodialysis patients and divided into two groups according to duration of dialysis > 5 year with 43 patient and < 5 years with 57 patients, written informed consent was obtained. Patients included in the research were fulfilled the following criteria:1) Patients under regular hemodialysis for at least 3 months.2) 18-70 years of age of both genders. 3) Capacity to provide informed consent. **Results:** hypoalbuminemia in addition to cardiovascular, respiratory, gastrointestinal, genitourinary, autonomic function and weight loss were significantly worse in the ≥5-year group of chronic hemodialysis. symptoms related to cardiovascular, respiratory, gastrointestinal, genitourinary, autonomic function and weight loss were significantly worse in the ≥5-year group. **Conclusion:** symptom burden increased with dialysis duration.

Key words: hemodialysis, symptoms, quality of life.

Introduction

Glomerular filtration rate <15 ml/min/ 1.73 m2 means kidney failure whic treated by renal replacement therapy (RRT) (either dialysis or transplantation) [1].

Hemodialysis initiated urgently in patients with uremic encephalopathy, pericarditis, life-threatening hyperkalemia, refractory acidosis and hypervolemia (pulmonary edema) [2].

Renal failure leads to accumulation of metabolic waste products in the body.

Hemodialysis helps in the removal of toxins from the body and improving the general condition of the patient [3].

There are multiple causes that lead to symptom burden in hemodialysis patients, a state of chronic inflammation with development of oxidative stress in patients undergoing hemodialysis. During hemodialysis, there is disruption immunological response by abnormal levels of IgG, the complement component, with activation of granulocytes in the blood with production of reactive oxygen species (ROS) and

exaggerate the oxidative stress response [4]. This oxidative stress may lead to a sequential change in organs that lead to multiple organ failures and then death as hypertension, dyslipidemia [5].

In addition to recurrent infections, the hemodialysis patients are considered immunocompromised with altered lymphocyte, monocyte, macrophage, and neutrophil function due to uremia [6].

Patients and methods
This descriptive cross-sectional study was conducted at the hemodialysis unit in Minia university Hospital on 100 hemodialysis patients and divided into two groups according to duration of dialysis > 5 year with 43 patient and < 5 years with 57 patients, written informed consent was obtained.
Patients included in the research were fulfilled the following criteria:
1) Patients under regular hemodialysis for at least 3 months.
2) 18-70 years of age of both genders.
3) Capacity to provide informed consent.
Exclusion criteria:
1) Unstable medical conditions
2) Acute kidney injury

Complete history including age, gender, history of previous medical conditions that lead to dialysis, in addition to clinical assessment of Vital signs (Blood pressure, Temperature, Heart rate, Respiratory rate), Signs of (Pallor, Cyanosis, Jaundice, Lymph node enlargement, dizziness - faintness - soreness in muscles - numbness of hand and foot and Itching). Body mass index (BMI) - height – weight.

- Laboratory study was done as complete blood picture (CBC), renal function test, Liver enzymes, serum albumin, serum bilirubin, Lipid profile, parathyroid hormone (PTH) and iron profile.
- Symptomatology surveillance including: Cardiovascular symptoms as tachycardia, palpitation, chest pain and missing beats, respiratory symptoms as chest tightness, dyspnea and choking feelings, gastro-intestinal symptoms as difficulty in swallowing, wind abdominal pain, burning sensation, abdominal fullness, nausea, vomiting, borborygmi, looseness of bowel and constipation, genitourinary symptoms as frequency, urgency, amenorrhea, menorrhagia, premature ejaculation, loss of libido and impotence, autonomic manife-stations as dry mouth, flushing, pallor, sweaty, giddiness and tension headache, in addition to weight loss. Each item is scored on a scale of 0 (not present), 1 (mild), 2 (mild to moderate), 3 (moderate to severe), 4 (severe).

Data management and Statistical Analysis:
All data were collected, tabulated and statistically analyzed using the statistical package of special science SPSS version 20.0. Quantitative data were expressed as mean ± SD (standard deviation) for parametric data median and range for non-parametric data. Qualitative data were expressed as frequencies and relative percentage.

Results
Table (1): Demographic data of the study group:

Variables		<5 years (n = 57)		≥5 years (n=43)		P value
Demographic						
Age (years)		45.46 ± 15.66		45.14 ± 15.52		0.936
Sex	male	30	52.6%	25	58.1%	0.686
	female	27	47.4%	18	41.9%	
Residence	Urban	23	40.4%	13	30.2%	0.297
	Rural	34	59.6%	30	69.8%	
Marital status	single	18	31.6%	12	27.9%	0.467
	married	18	31.6%	9	20.9%	
	widow	4	7.0%	3	7.0%	
	divorced	17	29.8%	19	44.2%	
Working		39	68.4%	14	32.6%	**<0.001***
Co morbidity						
Hypertension		19	33.3%	14	32.6%	0.935
DM		44	77.2%	37	86.0%	0.264

SD: **Standard deviation**,
p: p value for comparing between the two studied groups.   *: Statistically significant at p ≤ 0.05

There are many similarities in the demographic characteristics between the two-study groups except for employment status. It was significantly higher in the <5-year vs ≥5-year dialysis group (68% vs 33%, p<0.001). Co-existing hypertension and diabetes were similar between the two study groups.

Table (2): Clinical data of the study group:

Variables	<5 years (n = 57)	≥5 years (n=43)	P value
BP systole	151.32 ± 22.75	149.93 ± 23.22	0.738
BP diastole	82.40 ± 10.19	82.23 ± 8.53	0.884
Pulse	101.74 ± 15.56	103.77 ± 10.88	0.125
Temperature	37.08 ± .38	37.03 ± .42	0.393
Dry weight	87.67 ± 9.39	86.49 ± 8.66	0.115
Wet weight	90.51 ± 8.95	89.40 ± 8.73	0.886
UF (ultra-filtration)	2.22 ± 1.86	2.73 ± 1.69	0.808
Length	165.08 ± 9.32	162.66 ± 8.00	0.754
BMI	32.57 ± 5.90	32.88 ± 4.28	0.414
Edema	24 42.1%	21 48.8%	0.503

There were no significant differences in clinical parameters between the study groups.

Table (3): Laboratory investigations of the study group:

Variables	Duration of dialysis		*P value*
	<5 years (n = 57)	**≥5 years (n=43)**	
CBC			
TLC× 10(3)/µL	6.25 ± 1.73	6.55 ± 1.71	0.388
RBCs million/mm3	4.48 ± .29	4.57 ± .41	0.245
Hemoglobin g/Dl	10.07 ± .87	10.39 ± .80	0.200
Platelets10(3)/mm3 (10(3)/µL)	255.08 ± 37.87	268.94 ± 45.16	0.570
Serum Iron(µmol/L)	12.11 ± 3.79	12.45 ± 3.70	0.704
TIBC (µmol/L)	65.89 ± 19.07	69.27 ± 18.76	0.296
TSAT (%)	42.61 ± 13.19	41.55 ± 12.76	0.117
Serum Ferritin (ng/ml)	245.85 ± 110.89	269.20 ± 128.90	0.568
PT	13.53 ± 3.64	13.16 ± 3.79	0.358
PTT	39.19 ± 7.74	38.53 ± 9.59	0.669
INR	1.19 ± .34	1.19 ± .33	0.454
Liver function test			
Serum albumin g/Dl	3.46 ± .69	3.08 ± .92	**0.002***
SGOT(U/L)	32.21 ± 11.23	34.53 ± 11.76	0.319
SGPT(U/L)	21.07 ± 9.56	24.56 ± 8.02	0.589
Serum bilirubin gm/dl	3.09 ± .57	2.99 ± .52	0.279
Alkaline phosphatase iu/dl	4.11 ± .36	4.17 ± .30	0.211
Kidney function test			
Urea mg/dl	96.03 ± 5.89	95.89 ± 5.12	0.454
Serum creatinine mg/l	5.53 ± .87	5.71 ± .89	0.903
Serum uric acid mg/dl	7.39 ± 1.69	7.20 ± 2.22	0.508
Lipid profile			
Cholesterol mg/dl	162.05 ± 27.88	158.30 ± 21.74	0.762
HDL	35.51 ± 16.29	30.65 ± 12.61	0.378
LDL	100.95 ± 12.09	106.30 ± 10.52	0.592
Minerals and hormone			
Serum phosphorus(mg/dL)	6.88 ± 1.45	6.57 ± 1.40	0.933
PTH (pg/ml)	218.45 ± 126.02	219.77 ± 104.50	0.697
Serum potassium(mmol/l)	3.78 ± .65	3.91 ± .48	0.440
Serum sodium(mmol/l)	134.28 ± 3.07	133.60 ± 2.39	0.326

The dialysis groups demonstrated similar results across most laboratory parameters. The only significant difference was slightly lower serum albumin levels in the ≥5-year vs <5-year dialysis group (3.08 vs 3.46 g/dL, p=0.002).

Table (4): Laboratory investigations of the study group:

Category	Score	n	%	n	%	p-value
Cardiovascular symptoms	0	30	52.6%	12	27.9%	**0.005***
	1	21	36.8%	15	34.9%	
	2	5	8.8%	12	27.9%	
	3	1	1.8%	0	0.0%	
	4	0	0.0%	4	9.3%	
Respiratory symptoms	0	29	50.9%	12	27.9%	**0.007***
	1	22	38.6%	15	34.9%	
	2	6	10.5%	13	30.2%	
	3	0	0.0%	0	0.0%	
	4	0	0.0%	3	7.0%	
Gastrointestinal symptoms	0	6	10.5%	1	2.3%	**0.004***
	1	32	56.1%	16	37.2%	
	2	19	33.3%	20	46.5%	
	3	0	0.0%	6	14.0%	
	4	0	0.0%	0	0.0%	
Genitourinary symptoms	0	1	1.8%	0	0.0%	**0.005***
	1	34	59.6%	15	34.9%	
	2	22	38.6%	20	46.5%	
	3	0	0.0%	6	14.0%	
	4	0	0.0%	2	4.7%	
Autonomic symptoms	0	16	28.1%	3	7.0%	**0.001***
	1	21	36.8%	16	37.2%	
	2	20	35.1%	19	44.2%	
	3	0	0.0%	5	11.6%	
	4	0	0.0%	0	0.0%	
Loss of weight	0	9	15.8%	8	18.6%	**0.045***
	1	15	26.3%	8	18.6%	
	2	21	36.8%	20	46.5%	
	3	12	21.1%	7	16.3%	

symptoms related to cardiovascular, respiratory, gastrointestinal, genitourinary, autonomic function and weight loss were significantly worse in the ≥5-year group.

Discussion

End stage renal disease (ESRD) means that the kidneys fail irreversibly and necessitating renal replacement therapy as dialysis or kidney transplantation [7].

This descriptive cross-sectional study was conducted on 100 hemodialysis patients attending hemodialysis unit in Minia university Hospital. The current study compared HD patients with dialysis duration of more than 5 years (n = 57) and patients with dialysis duration of less than 5 years (n = 43).

As regards the demographic data, there was no significant association between HD duration and demographic characteristics except for employment status. Employment was significantly higher in the <5 years vs ≥5 years dialysis group (68% vs 33%, p<0.001), this may be due to chronic hemodialysis patients have impaired physical and mental function low employment rates which may affect social functioning, self-esteem, health-related quality of life and financial status. The cost to society is high as well [8].

This in agreement with Barzegar et al., 2017 [9] which suggested that the patients with a duration of hemodialysis less than 36 months higher in employment state compared to those of patients with longer duration of hemodialysis.

In laboratory data, the only significant difference was hypoalbuminemia in the ≥5 years vs <5 years dialysis group (3.08 vs 3.46 g/dL, p=0.002). Hypoalbuminemia is considered a major risk factor for morbidity and mortality in dialysis patients. Minatoguchi et al., 2018 [10] showed that hypoalbuminemia is considered an independent risk factor for infection among hemodialysis patients. Also, Chen et al., 2021 [11] revealed a significant association between the hypoalbuminemia and longer duration of HD (p= 0.002).

However, Boz & Uludag, 2021 [12] and Minatoguchi et al., 2018 [10] revealed no relation by serum albumin levels and dialysis duration among patients receiving hemodialysis therapy, it may be due to the difference in study settings.

Hemodialysis symptoms burden was significantly worse in the ≥5-year group (p≤0.007), this in agreement with Yu et.al, 2012 [13] reported that increased symptom burden in patients with chronic hemodialysis mainly related to prolonged dialysis duration, dialysis insufficiency, anemia, hypoalbuminemia. Zhang et al. 2016 [14] also reported that patients on hemodialysis for less than 1 year have the highest symptom burden then followed by patients with a dialysis duration of more than 10 years. Also, Myint et al. 2013 [15] found that symptom burden increased in patients of hemodialysis with higher comorbidities. In another hand, there are some studies have not revealed the association between symptom burden and these clinical data [16].

References

1- Kalantar-Zadeh, Kamyar, Tazeen H. Jafar, Dorothea Nitsch, Brendon L. Neuen, and Vlado Perkovic. ―chronic kidney disease. ‖ The Lancet 2021. 398(10302):786–802.

2- Gameiro, Joana, José Agapito Fonseca, Cristina Outerelo, and José António Lopes. Acute Kidney Injury: From Diagnosis to Prevention and Treatment Strategies. ‖ Journal of Clinical Medicine 2020. ―9(6):1704.

3- Punj, Shweta, Alsoufi Enaam, Alonso Marquez, Arthur J. Atkinson, and Daniel Batlle. A Survey on Dialysis-Related Muscle Cramping and a Hypothesis of Angiotensin II on Its Pathophysiology. ‖ Kidney International Reports. 2020. 5(6):924–26.

4- Ramos-González, E. J., O. K. Bitzer-Quintero, G. Ortiz, J. J. Hernández-Cruz, and L. J. Ramírez-Jirano. 2021. ―Relationship between Inflammation and Oxidative Stress and Its Effect on Multiple Sclerosis. ‖ Neurologia.

5- Kitching, A. Richard, and Michael J. Hickey. Immune Cell Behaviour and Dynamics in the Kidney—Insights from in Vivo Imaging. ‖ Nature Reviews Nephrology 2022.18(1):22–37.

6- Erickson, Kevin F., Bo Zhao, Vivian Ho, and Wolfgang C. Winkelmayer. Employment among Patients Starting Dialysis in the United States. ‖ Clinical Journal of the American Society of Nephrology: 2018, CJASN 13(2):265.

7- Price, I. N., & Wood, A. F. Chronic kidney disease and renal repla-cement therapy: an overview for the advanced clinical practitioner. British Journal of Nursing, (2022)31(3),124-134

8- Nie, Y., Witten, B., Schatell, D., Assari, S., Ding, X., Saran, R., & Bragg Gresham, J. L. Changes in employment status prior to initiation of maintenance hemodialysis in the USA from 2006 to 2015. Clinical kidney journal, (2019). 13(3),434–441.https://doi.org/ 10.1093 /ckj/sfz077

9- Barzegar, H., Jafari, H., Charati, J. Y., & Esmaeili, R., Relationship between duration of dialysis and quality of life in hemodialysis patients. Iranian Journal of Psychiatry and Behavioral Sciences, (2017). 11(4).

10- Minatoguchi, S., Nomura, A., Imaizumi, T., Sasaki, S., Ozeki, T., Uchida, D., ... & Fujita, Y., Low serum albumin as a risk factor for infectionrelated in-hospital death

among hemodialysis patients hospital-lized on suspicion of infectious disease: a Japanese multicenter retrospective cohort study. Renal Replacement Therapy, (2018).4, 1-7.

11- Chen, C., Zhang, J., Zhou, Z., Liu, J., Li, C., & Liu, C., Impact of serum albumin level and variability on short-term cardiovascular-related and all-cause mortality in patients on maintenance hemodialysis. Medicine, (2021).100(43), e27666.

12- Boz, G., & Uludag, K. Serum Albumin Trends in Relation with Prognosis of Individuals Receiving Hemodialysis Therapy. Cureus, (2021). 13(11), e19958. https://doi.org/10.7759/cureus.19958

13- Yu I.C., Huang J.Y., Tsai Y.F. Symptom cluster among hemodialysis patients in Taiwan. *Appl Nurs Res.* 2012; 25(3): 190–196. [PubMed] [Google Scholar] [Ref list]

14- Zhang X.Q. Zhejiang Chinese Medical University; Hangzhou: 2016. Symptom burden and its influence factors among patients receiving maintenance hemo-dialysis: a cross-sectional study. [Google Scholar] [Ref list]

15- Myint T.M., Jois S., Gordon K., Byrnes M., Suranyi M., Makris A. A cross-sectional descriptive study of palliative care outcome scale-symptoms in end stage renal disease (POSs-renal) reported by haemodialysis patients and staff. *Nephrology.* 2013;18:29. [Google Scholar] [Ref list]

16- Hao Y.H. Peking union medical college; Beijing: Study of symptoms in hemodialysis patients. 2016. [Google Scholar] [Ref list].