Journal of Recent Advances in Medicine

Journal of Recent Advances in Medicine
AFMG
Al-Azhar University
Faculty of Medicine for Girls
Print ISSN: 2636-252X
Online ISSN: 2636-2538

Original Article

Evaluation of dry weight in haemodialysis patients

Nephrology

Dina A. H.Abd-Rabo[1], Fatma A. A. Mohamed[1], Amal H. Ibrahim [1], Manal A. Abd El-Hafez [2]

1 Internal Medicine Department, Faculty of Medicine for Girls, Cairo, Al -Azhar University, Egypt.

2 Pediatrics Department, Faculty of Medicine for Girls, Cairo, Al -Azhar University, Egypt.

ABSTRACT

Background: A difficult task is to estimate the dry weight of hemodialysis (HD) patients. Many tools are available, but not for every HD center. Several strategies have been used to derive a more standard method of assessing dry weight in hemodialysis patients. Bioimpedance spectroscopy (BIS) device has been validated against gold standard methods of volume assessment.

Objective: Assessment of hemodialysis (HD) patients' dry weight and try to find the most accurate and applied method to help those patients keep in the euvolemic state.

Methodology: This cross-sectional observational study was conducted on adult and pediatric hemodialysis patients at Al-Zahraa hospital, Al-Azhar University hospital during the period from august 2019 to march 2021 after verbal consents were obtained from the participants in adults' group and caregiver in the pediatric patients; clinical assessments were performed, including assessing congested neck veins. Respiratory distress, in the same line with ultrasound assessment of inferior vena cava (IVC) diameter and BIS before and after hemodialysis in the study groups.

Results: In the adult population on the clinical assessment before hemodialysis, neck veins are congested in 17 (68%) out of 25 cases versus 0 (0%) in the pediatric age group; meanwhile, IVC diameter exceeds the reference range in 19 (72%), but in the pediatric age group, it does not exceed the normal reference range in all cases. Meanwhile, BIS assessment, 23 (92%) of the adult group are overhydrated versus 7 (28%) in the pediatric age group.

Conclusion: Body composition monitoring seemed to be a helpful diagnostic tool that reasonably complements existing clinical methods in assessing the dry weight of HD patients.

JRAM 2022; 3(1):38-44

Keywords: Dry weight; hemodialysis; body composition monitor; bioimpedance spectroscopy.

Submission Date: 29 May 2021 **Acceptance Date:** 5 July 2021

Corresponding author: Dina Atef Hussien Abd-Rabo, Internal medicine department, faculty of medicine for girls, Cairo, Al-Azhar University, Egypt. **Tel:** +201552568092. **E-mail:** dr.dinaatef@hotmail.com

Please cite this article as: Abd-Rabo DAH, Mohamed FAA, Ibrahim AH, Abd El-Hafez MA. Evaluation of dry weight in haemodialysis patients. JRAM 2022; 3(1):38-44. DOI: 10.21608/jram.2021.75991.1118

INTRODUCTION

In patients with end-stage renal disease (ESRD) undergoing maintenance hemodialysis (HD) treatment, excessive fluid volume is considered a risk factor for death. Furthermore, Fluid elimination to accomplish dry weight is a crucial component of HD treatment for ESRD patients [1]. Chronic volume overload is associated with systemic hypertension, increased left ventricular hypertrophy, and cardiovascular-related mortality [2].To reach this goal, the concept of "dry weight" developed to guide ultrafiltration (UF) to achieve regular hydration at the end of each HD session [3].

Several objective methods are suggested to support the correct estimation of dry weight in dialysis patients, including ultrasound of the inferior vena cava vein, echocardiography and radionuclide dilution techniques. Nevertheless, these techniques are time-consuming and difficult to be done in the daily practice. Furthermore, they are less precise as they are unable to measure fluid excess or deficiency. In most dialysis centers, dry weight assessment is therefore merely based on individual clinical criteria [4].

Bioimpedance spectroscopy (BIS) is a non-invasive technique to assess extracellular volume and total body water. Improvements in Bioimpedance technology have offered an opportunity to enhance the ability to identify the appropriate dry weight more precisely to achieve normal volume status in HD patients [5]. The Bioimpedance spectroscopy (BIS) method has been popular in evaluating the body composition due to its low cost and simplicity. The body composition pattern describes the intracellular and extracellular water content of adipose tissue mass (ATM), lean tissue mass (LTM), and excess fluid OH [5]. The LTM, ATM, and OH are attained from body height and weight, whole-body intracellular water (ICW) and extracellular water (ECW) determined by BIS [3]. We aimed to assess and find the most accurate and applied method to help patients on regular HD to keep them in a euvolemic state.

SUBJECTS AND METHODS

This cross-sectional observational study was conducted on 50 patients on regular hemodialysis. We selected the patients from the nephrology and hemodialysis unit of pediatric and internal medicine departments of Al-Zahraa hospital al Azhar University.

They were divided into two groups: Adult group: including 25 patients age ≥ 18 years and, pediatric group: including 25 patients, their age range between 12 – 15 years. They were on regular hemodialysis three sessions weekly for 4 hours/session; the most common cause of CKD in the adult group was hypertension 12 (48%) patients then followed by diabetes mellitus 7 (28%) patients while the most common etiology in the pediatrics group is congenital cause 8 (32%) patients followed by acquired and hereditary causes. we excluded patients with (acute kidney injury, advanced liver disease, heart failure who underwent primary surgical procedure within three months of the study).

We obtained written consent from all patients in the adult group and caregivers of the pediatric age group before getting them involved in the study in adherence with the ethical committee of faculty of medicine for girls, Al-Azhar University, Cairo, Egypt.

All patients have subjected to the following: full detailed medical history, general and local examination were made pre-and post-dialysis, dry weight was assessed half an hour before and after the mid-week HD session in all patients by clinical assessment, including assessment of congested neck veins. Chest auscultation. Ultrasound assessment of IVC diameter and body composition monitor (BCM) machine (BCM **®;** Fresenius Medical Care, Bad Homburg, Germany).

Statistical analysis

Data were collected, revised, coded, and entered into the Statistical Package for Social Science (IBM SPSS) version 23. Quantitative data were expressed as mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage. The following tests were used; independent-samples t-test of significance was used when comparing between two means. Chi-square (X2) test of significance was used in order to compare proportions between two qualitative parameters. The interpretation of probability values is $p>0.05$: non-significant, $p<0.05$: significant.

RESULTS

Table (1) shows age and sex of the study groups. Table (2) showed a significant decrease in both systolic and diastolic blood pressure in both groups post-dialysis versus pre-dialysis, a significant decrease in cases with congested neck veins in the adult population 2 (8%) post-dialysis versus 17 (68%) pre-dialysis, meanwhile in the pediatric population revealed no congested neck veins even pre-dialysis, the same table revealed a significant decrease in cases with basal crepitation's post-dialysis 3 (12%), 0 (0%) versus 17 (68%), 8 (32%) pre-dialysis in adult and pediatric patients respectively.

Table (3) shows a significant decrease in IVC diameter in the adult and the pediatric population post-dialysis versus pre-dialysis Table (4) shows that significant decrease in BIS measurements pre- and post-dialysis in both groups.

Table (5) shows an assessment of the dry weight by the different methods used in the current work as we noticed that BIS is more sensitive as it detects 23 (92%) out of 25 versus 19 (76%) and 17 (68%) detected by IVC and congested neck veins respectively in the adult group meanwhile in the pediatric group 7 (28%) were overhydrated detected by BIS versus 0 (0%) and 1 (4%) by IVC diameter and congested neck veins respectively

Table (1): Age and sex of the studied groups

Items	Adult group (n=25)	Pediatric group (n=25)
Age (years)		
Mean ± SD	54.28 ± 11.10	13.28±0.99
Range	30 - 70	12-15
Sex		
Male	16 (64%)	17(68%)
Female	9 (36%)	8(32%)

Table (2): Clinical data of the studied groups

Items		Adult group (n=25)	Pediatric group (n=25)
Systolic blood pressure mmHg			
Pre-HD	Mean ± SD Range	140.20 ± 13.42 120 - 180	124.40 ± 17.64 100 - 160
Post-HD	Mean ± SD Range	128.20 ± 9.45 115 - 150	113.80 ± 17.87 90 - 150
	Mean Difference t. test P-value	12.00 ± 3.97 9.537 0.000	10.60 ± (-0.23) 5.076 0.000
Diastolic blood pressure mmHg			
Pre-HD	Mean ± SD Range	84.20 ± 6.40 70 - 100	73.60 ± 12.87 50 - 100
Post-HD	Mean ± SD Range	79.20 ± 4.49 70 - 85	70.80 ± 12.22 50 - 90
	Mean Difference t. test P-value	5.00 ± 1.91 3.780 0.000	2.80 ± 0.65 1.429 0.166
Chest Auscultation			
Pre-HD	Free Basal crepitation's	8 (32%) 17 (68%)	17 (68%) 8 (32%)
Post HD	Free Basal crepitation's	22 (88%) 3 (12%)	25 (100%) 0 (0%)
	t. test p-value	16.333 0.000	9.524 0.002
Neck Veins			
Pre-HD	Congested Not Congested	17 (68%) 8 (32%)	0 (0%) 25 (100%)
Post HD	Congested Not Congested	2 (8%) 23 (92%)	0 (0%) 25 (100%)
	t. test p-value	19.100 0.001	NA NA

HD: Hemodialysis, NA: not available

Table (2): Inferior vena cava diameter pre and post-dialysis in patients groups

IVC diameter (cm)	Pre-dialysis	Post-dialysis	Mean Difference	Test value	p-value
Adult group	2.31±0.57 (1.6 - 3.40)	1.18±0.47 (0 - 2.6)	1.12±0.54	10.352	0.001*
Pediatric group	1.43 ± 0.19 (1.16– 1.70)	1.34±0.17 (1.1 – 1.6)	0.09±0.08	5.630	0.001*

IVC: inferior vena cava, *: Significant p value

Table (3): Volume status assessment by Bio impedance spectroscopy (BIS) in studied groups

BIS assessment/L		Pre-dialysis	Post-dialysis	p-value
Adult group	Median (IQR) Range	3.1 (2.0 – 3.8) -0.20 – 5.0	0.0 (-0.15 – 0.0) -0.9 – 2	0.001*
Pediatric group	Median (IQR) Range	-0.5 (-0.5 – 0.5) -1.3 – 3	-1.0 (-1.5 – -0.8) -2.7 – 0	0.001*

BIS: Bioimpedance spectroscopy, *: Significant p value.

Table (4): Assessment of dry weight clinically, IVC diameter, and bioimpedance spectroscopy

Dry weight assessment		Adult Group		Test value	P-value	Pediatric Group		Test value	P-value
		Pre-HD	Post-HD			Pre-HD	Post-HD		
Clinical	Congested NV	17 (68%)	2 (8%)	19.100	0.000	0 (0%)	0 (0%)	NA	NA
	Not-Congested NV	8 (32%)	23 (92%)			25 (100%)	25 (10%)		
IVC (cm)	> 1.7 cm	19 (76%)	1 (4%)	27.000	0.000	0 (0%)	0 (0%)	NA	NA
	≤ 1.7 cm	6 (24%)	24 (96%)			25 (100%)	25 (100%)		
BIS (L)	Overhydrated	23 (92%)	3 (12%)	32.051	0.000	7 (28%)	0 (0%)	8.140	0.004*
	On dry weight	2 (8%)	22 (88%)			18 (72%)	25 (100%)		

HD: Hemodialysis, IVC: inferior vena cava, BIS: Bioimpedance spectroscopy, *: Significant p value.

DISCUSSION

Pediatrics on hemodialysis have higher cardiovascular morbidity and mortality incidence [6-7]. Fluid management is fundamental to manage end-stage chronic renal failure to enhance cardio-vascular tolerance to dialysis management, quality of life, and survival [8]. For the reason that clinical evaluation in dialysis patients is believed to be subjective and ill-defined, using another diagnostic technique is required. These may embrace ultrasound of the lung and IVC, intradialytic blood volume monitoring (BVM), BIS and natriuretic peptide measurement [9-11].

We evaluated the study groups' volume status by blood pressure measurements, assessing neck veins and chest auscultation, which express the clinical evaluation. We noticed a significant decrease in the blood pressure post-dialysis versus pre-dialysis in adult and pediatric cases in the current study. Excess fluid in ESKD patients is distributed between the intravascular and interstitial compartments in steady-state conditions; the clinically significant parameter is intravascular fluid overload considering that this directly increases systemic blood pressure and cardiovascular complications [12].

Regular clinical evaluation and assessment of blood pressure before dialysis and inter-dialytic weight gain (IDWG) are presently the backbones of assessment of fluid in pediatric patients on dialysis [13]. Pre-dialytic blood pressure is not exclusively regulated by intravascular volume and is confounded by other aspects such as exercise and stress associated physiological variation and compromised cardiac function [12]. Remarkably, in the pediatric population, no one had congested neck veins compared to the adult group, as we noticed 17 (68%) had congested neck veins pre-dialysis versus 2 (8%) post-dialysis. Neck vein assessment seems to underestimate the dry weight, particularly in the pediatric population. Meanwhile, positive chest auscultatory finding in the pediatric group is detected in 8 (32%) in comparison to the 17 (68%) in the adult population. Physical examination is insensitive to fluid overload until the level approaches 10% of the child's body weight, representing severe fluid overload, so the number of emerging techniques to facilitate objective measurement of fluid overload in dialysis patients, particularly the pediatric age group.

In the current study, in the same line with clinical assessment, Bioimpedance analysis and IVC diameter (IVCD) have been evaluated and utilized in the study groups as non-invasive parameters for assessing dry weight and volume status. In the pediatric group, the mean IVC diameter does not exceed the average IVC diameter using age-related reference limits despite a significant difference between pre and post hemodialysis. IVC is frequently used in adults. It exceeds the average cutoff point in 17 (68%) of the study group; IVCD has occasionally been used in children.

Measurement of IVC parameters was recommended as a tool to calculate approximately target weight for adult population on dialysis approximately two decades ago [14] and has afterwards been established to reveal surplus intravascular volume [15]. Pediatric reports on this procedure are sparse, with one study revealing improvement in IVC collapsibility index following ultrafiltration in 16 children who were on peritoneal dialysis (PD) and nine on HD [16]. IVC has some restrictions, it is not appropriate for young children, infants, or those who cannot hold their breath on demand. Additionally, it is challenging to gain acceptable images even for highly trained observers, not completely practical as a bedside method. These matters may underlie the deficiency of widespread acceptance of this technique in clinical practice [12]. Varvara et al.[17] reported that IVCD measurements unaccompanied are not dependable for precise fluid status expectation in hemodialyzed children as they appear to underestimate fluid overload in comparison to clinical criteria and BIS. Torterüe et al. [18] reported that pre-dialytic assessment of IVC diameter is not enough to evaluate volume status but can predict high blood pressure which is volume-dependent in children on regular HD, and other techniques are needed.

Bioimpedance approach has been recognized over the past few years as a more objective method to assess fluid status in dialysis patients [19-20], BIS assessment of volume status in the study population, we recorded 23 (92%) 23 overhydrated pre- dialysis versus 3 (12%) post-dialysis in the adult group meanwhile, in the pediatric group, it revealed 7 (28%) overhydrated pre-dialysis versus zero cases post-dialysis. It seems more sensitive than the clinical and IVC diameter. In contradiction with the current findings, Chang et al. [21] and Vitturi et al. [22] reported that IVC has the significant advantage over the BIS, that it can represent the intravascular volume status during a hemodialysis session in real-time for the observer. Kouw et al. [23]

showed that, in adults, both BIS with IVCD techniques that have been utilized were highly correlated with each other and with post-dialysis fluid status. Meanwhile**,** Oe et al. [24] compared BIS with IVCD; they supposed to replace IVCD with BIS but only insignificant underhydration. Inadequate data are available on the accurateness of BIS in measuring fluid overload in ESKD children [25]. Overhydration evaluated by using BIS was compared to systolic blood pressure in a retrospective study of 23 children; no correlation was detected [26]. This matter was addressed in a study of 30 children with chronic kidney disease (CKD) and 13 controls but again discovered no correlation between systolic blood pressure Z score in children and BIS over-hydration measurements [27]. Wizemann et al. [28] used BIS to evaluate hydration in 269 patients on HD and stated that OH determined by BCM was a solid and independent risk factor of mortality at 3.5 years. Malhotra et al. [29] who performed 100 assessments on 34 patients attending to the hospital for maintenance hemodialysis with the mean age was 54.3 + 11 years, he reported that 40% of the cases after dialysis had fluid overload on Bioimpedance. Passauer et al. [4] stated that fluid overload before dialysis ranged from −0.5 to 4 L and after dialysis was from −2.5 to 2 L which is consistent with the current study assessment. Also, Steinwandel et al. [30] and Asmat et al. [31] found comparable results with BIS assessment of dry weight. Many studies reported BIS appears to have significant possibility in the evaluation of hydration status and DW measurement [17-18, 32-34]. In contrast to us and other studies, reported no significant difference in estimated DW by the BIA and conventional method [35, 37].

CONCLUSION

The Body composition monitor seemed to be a beneficial diagnostic tool that reasonably complements existing clinical methods in the management of assessment of the dry weight of HD; BIS is more accurate in the detection of overhydrated patients than clinical assessment and IVCD measurement, particularly in the pediatric age group.

Financial support : No financial support
Conflict of interest : No conflict of interest

REFERENCES

1. **Antlanger M, Josten P, Kammer M, Exner I, Lorenz-Turnheim K, Eigner M, et al.** Blood volume-monitored regulation of ultrafiltration to decrease the dry weight in fluid-overloaded hemodialysis patients: a randomized controlled trial. BMC nephrology. 18(1), 1-11, 2017.
2. **Chua HR, Xiang L, and Chow PY.** Quantifying acute changes in volume and nutritional status during haemodialysis using bioimpedance analysis. Nephrology (Carlton). 17:695–702, 2012.
3. **Patel HV, Annigeri RA, and Kowdle PC.** Bioimpedance Spectroscopy-Guided Ultra-filtration Normalizes Hydration and Reduces Intradialytic Adverse Events in Hemodialysis Patients. Indian J Nephro. 29; 1:1-7, 2019.
4. **Passauer J, Petrov H, Schleser A, Leicht J, and Pucalka K.** Evaluation of clinical dry weight assessment in haemodialysis patients using bioimpedance spectroscopy: a cross-sectional study. Nephrol. Dial. Transplant. Off. Publ. Eur. Dial. Transpl. Assoc. - Eur. Ren. Assoc. 25:545–51. 2010.
5. **Wabel P, Chamney P, Moissl U, and Jirka T.** Importance of whole-body bioimpedance spectroscopy for the management of fluid balance. Blood Purif. 27; 1:75-80, 2009.
6. **Oh J, Wunsch R, Turzer M, Bahner M, Raggi P, Querfeld U, et al.** Advanced coronary and carotid arteriopathy in young adults with childhood-onset chronic renal failure. Circulation. 106:100–105, 2002.
7. **Querfeld U and Schaefer F.** Cardiovascular risk factors in children on dialysis: an update. Pediatr Nephrol. 35, 41-57, 2020.
8. **Chazot C, Wabel P, Chamney P, Moissl U, Wieskotten S, and Wizemann V.** Importance of normohydration for the long-term survival of haemodialysis patients. Nephrol. Dial. Transplant. 27:2404–2410, 2012.
9. **Rosner MH and Ronco C.** Techniques for the Assessment of Volume Status in Patients with End Stage Renal Disease. Semin Dial. 27: 538–541, 2014.
10. **Davies SJ and Davenport A.** The role of bioimpedance and biomarkers in helping to aid clinical decision-making of volume assessments in dialysis patients. Kidney Int. 86: 489–496, 2014.
11. **Beaubien-Souligny W, Kontar L, and Blum D.** Meta-analysis of randomized controlled trials using tool-assisted target weight adjustments in chronic dialysis patients. Kidney Int Rep. 4:1426-1434, 2019.
12. **Hayes W and Paglialonga F.** Assessment and management of fluid overload in children on dialysis. Pediatric Nephrology.34(2), 233-242, 2019.
13. **Fischbach M, Zaloszyc A, and Shroff R.** The interdialytic weight gain: a simple marker of left ventricular hypertrophy in children on chronic haemodialysis. Pediatric Nephrology. 30(6), 859-863, 2015.
14. **Cheriex EC, Leunissen KML, Janssen JHA, Mooy JMV, and Van Hooff JP.** Echography of the inferior vena cava is a simple and reliable tool for estimation of ‘dry weight’in haemodialysis patients. Nephrology Dialysis Transplantation. 4(6), 563-568, 1989.
15. **Agarwal R, Bouldin JM, Light RP, Garg A.** Inferior vena cava diameter and left atrial diameter measure volume but not dry weight. Clinical Journal of the American Society of Nephrology. 6(5), 1066-1072, 2011.
16. **Haciomeroglu P, Ozkaya O, Gunal N, and Baysal K.** Venous collapsibility index changes in children on dialysis. Nephrology. 12:135-139, 2007.

17. **Varvara A, Georgia M, George S, Georgia G, and Andromachi M.** Comparison between inferior vena cava diameter, bioimpedance spectroscopy and clinical criterion for dry weight estimation in hemodialyzed children. Nephrology Dialysis Transplantation. 35(3), 1807, 2020.
18. **Torterüe X, Dehoux L, and Macher MA.** Fluid status evaluation by inferior vena cava diameter and bioimpedance spectroscopy in pediatric chronic hemodialysis. BMC Nephrol. 18**:**373, 2017.
19. **Thomasset AL, Lenoir MJ, Roullet MC, Jenin P, Béruard M, Bernard CH et al.** The physiological surveillance of hemodialysis sessions by the continuous measurement of LF impedance of the circulating blood (Thomasset's method). Clinical and experimental dialysis and apheresis. 7(3), 235-250, 1983.
20. **Chamney PW, Krämer M, Rode C, Kleinekofort W, and Wizemann V.** A new technique for establishing dry weight in hemodialysis patients via whole body bioimpedance. Kidney international. 61(6), 2250-2258, 2002.
21. **Chang ST, Chen CC, Chen CL, Cheng HW, Chung CM, and Yang TY.** Changes of the cardiac architectures and functions for chronic hemodialysis patients with dry weight determined by echocardiography. Blood Purif. 22:351-9, 2004.
22. **Vitturi N, Dugo M, Soattin M, Simoni F, Maresca L, Zagatti R et al.** Lung ultrasound during hemodialysis: the role in the assessment of volume status. International urology and nephrology, 2014; 46(1), 169-174.
23. **Kouw PM, Kooman JP, Cheriex EC, Olthof CG, Vries PM, and de Leunissen KM.** Assessment of postdialysis dry weight: a comparison of techniques. J Am Soc Nephrol. 4:98–104, 1993.
24. **Oe B, Fijter CW de, Oe PL, Stevens P, and Vries PM de.** Diameter of inferior caval vein (VCD) and bioelectrical impedance analysis (BIA) for the analysis of hydration status in patients on hemodialysis. Clin Nephrol. 50:38-43, 1998.
25. **Milani GP, Groothoff JW, Vianello FA, Fossali EF, Paglialonga F, Edefonti A et al.** Bioimpedance and fluid status in children and adolescents treated with dialysis. Am J Kidney Dis. 69:428-435, 2017.
26. **Zaloszyc A, Schaefer B, Schaefer F, Krid S, Salomon R, Niaudet P, et al.** Hydration measurement by bioimpedance spectroscopy and blood pressure management in children on hemodialysis. Pediatr Nephrol. 28:2169–2177, 2013.
27. **Eng CSY, Bhowruth D, Mayes M, Stronach L, Blaauw M, Barber A, et al.** Assessing the hydration status of children with chronic kidney disease and on dialysis: a comparison of techniques. Nephrol Dial Transplant. 33(5):847-855, 2017.
28. **Wizemann V, Wabel P, Chamney P, Zaluska W, Moissl U, and Rode C.** The mortality risk of overhydration in haemodialysis patients. Nephrol Dial Transplant. 24:1574-9, 2009.
29. **Malhotra R, Craven T, Ambrosius WT, Killeen AA, Haley WE, Cheung AK, SPRINT Research Group.** Effects of intensive blood pressure lowering on kidney tubule injury in CKD: a longitudinal subgroup analysis in SPRINT. American Journal of Kidney Diseases. 73(1), 21-30, 2019.
30. **Steinwandel U, Gibson N, Towell, Barnard A, Parsons R, Rippey J, et al.** Does the intravascular volume status in haemodialysis patients measured by inferior vena cava ultrasound correlate with Bioimpedance spectroscopy? Journal of clinical nursing. 28(11-12), 2135-2146, 2019.
31. **Asmat H, Iqbal R, Sharif F, Mahmood A, Abbas A, and Kashif W.** Validation of bioelectrical impedance analysis for assessing dry weight of dialysis patients in Pakistan. Saudi Journal of Kidney Diseases and Transplantation. 28(2):285, 2017.
32. **Basile C, Vernaglione L, Di Iorio B, Bellizzi V, Chimienti D, Lomonte C, et al.** Development and validation of Bioimpedance analysis prediction equations for dry weight in hemodialysis patients. Clinical Journal of the American Society of Nephrology. 2(4), 675-680, 2007.
33. **Cooper BA, Aslani A, Ryan M, Zhu FY, Ibels LS, Allen BJ, et al.** Comparing different methods of assessing body composition in end-stage renal failure. Kidney international. 58(1): 408-416, 2000.
34. **Alijanian N, Naini AE, Shahidi S, Liaghat L, and Samani RR.** The comparative evaluation of patients' body dry weight under hemodialysis using two methods: bioelectrical impedance analysis and conventional method. Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences.17(10), 923, 2012.
35. **Gulhane H, Saldanha N, Parekh I, Wali M, Virani Z, Rajput P, et al.** Bioelectrical impedance analysis for assessing dry weight of dialysis patients using InBody S10. Journal of Renal Nutrition and Metabolism. 4(4), 117-117, 2018.
36. **Park M, Eom K, Jung MH, Park YS, Lee JY, and Nam SH.** Design of bioimpedance electrode topologies for specific depth sensing in skin layer. In 2020 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society. 3961-3964**,** 2020.
37. **Allinovi M, Saleem MA, Burgess O, Armstrong C, and Hayes W.** Finding covert fluid: methods for detecting volume overload in children on dialysis. Pediatric Nephrology. 31(12): 2327-2335, 2016.

الملخص العربي

تقييم الوزن الجاف لمرضى الاستصفاء الدموي

دينا عاطف حسين عبدربه[1]،فاطمة عبد القادر عطية محمد[1]،امل حسين ابراهيم[1]،منال عبدالسلام عبد الحافظ[2]
[1] قسم امراض الباطنة العامة، كلية طب البنات، جامعة الأزهر، القاهرة، جمهورية مصر العربية.
[2]قسم طب الاطفال، كلية طب البنات، جامعة الأزهر، القاهرة، جمهورية مصر العربية.

ملخص البحث

الخلفية: يعتبر تقييم الوزن الجاف لمرضى الاستصفاء الدموي مهمة صعبة، تتوفر العديد من الطرق ولكن ليست جميعها متاحة في مراكز الاستصفاء الدموي، و كانت اهم هذه الطرق هو جهاز التحلل الطيفي.

الهدف: تقييم الوزن الجاف والحصول على ادق وافضل طريقة للحصول على الوزن الجاف في مرضى الاستصفاء الدموي.

الطرق: هذه الدراسة عبارة عن دراسة رصدية تمت في وحدات الغسيل الكلوي الدموي للمرضي البالغين والأطفال بمستشفى الزهراء الجامعي من الفترة اغسطس 2019 الى الفترة مارس 2020 بعد الحصول على الموافقة من المرضى البالغين و اولياء امور المرضى الاطفال و فد تم فحص طبي إكلينيكي لهم وذلك عن طريق قياس ضغط الدم داخل الشريان الوداجي الداخلي وفحص الصدر لتبين علامات الارتشاح الرئوي من عدمه او تقييم قطر الوريد الأجوف السفلي باستخدام الأشعة التليفزيونية واستخدام التحليل الطيفي بواسطة جهاز تحليل مكونات الجسم.

النتائج: في مجموعة البالغين يوجد 17 مريض لديهم احتقان في اوردة العنق بينما لا يوجد في مجموعة الاطفال. بينما قياس قطر الوريد الاجوف السفلى يزيد عن معدله الطبيعي في 19 مريض ولكن في مجموعة الاطفال جميعهم في المعدل الطبيعي وعند استخدام التحليل الطيفي وجدنا 23 مريض من مجموعة البالغين و 7 حالات من مجموعة الاطفال يعانون من فرط السوائل.

الاستنتاجات: جهاز التحليل الطيفي يبدو أداة تشخيصية مفيدة و مكملة للفحص الإكلينيكي لتقييم الوزن الجاف لمرضى الاستصفاء الدموي.

الكلمات المفتاحية: الوزن الجاف، استصفاء دموي، التحليل الطيفي.

الباحث الرئيسي
الأسم: دينا عاطف حسين عبدربه، قسم امراض الباطنة العامة، كلية الطب البنات، جامعة الأزهر، القاهرة، جمهورية مصر العربية.
الهاتف:+201552568092
البريد الإلكتروني:dr.dinaatef@hotmail.com