THE COMBINATION OF BIOIMPEDANCE, PROTEIN-ENERGY LOSS AND A MALNUTRITION-INFLAMATION SCORE IS USEFUL FOR ESTABLISHING EARLY NUTRITIONAL INTERVENTION

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Introduction. There is no simple and objective method available for assessing nutritional status and identifying malnutrition in chronic kidney disease. **Objective**: Combination of some of the currently tools (clinical, biochemical, anthropometric and body composition monitoring by bioimpedance (BCM), malnutrition-inflamation score (MIS)) to assess the nutritional status of our patients in online hemodiafiltration (HDF), determine the prevalence of protein energetic waste (PEW) and identify those patients at most risk of malnutrition and requiring preferential nutritional intervention.

Material and Methods.

- Observational cross-sectional study
- N: 91 patients in online HDF treatment
- 64 men, 27 women.
- Age: 60 14 years.
- Nutritional status was determined by :
  - anthropometric (biceps and triceps skinfold thickness, abdominal perimeter, MCA -muscle circumference arm-)
  - blood tests (Albumin, Prealbumin, Transferrin, Total Cholesterol, Total Protein, Creatinine, PCR)
  - BCM (Fresenius ®)
  - MIS score
- Patients were classified in those with/without PEW, and compared with a patient classification in adequate or inadequate nutritional status according to BCM (Figure 1) and with data obtained with the MIS score.

Table 1. PEW definition: Presence of 3 of the 4 categories with at least one item in each category

1.- Biochemical Markers	a. Albumin <37 g / L b. Prealbumin <0.3 g / L
2.- Body mass Index	BMI <23 kg/m2
3.- Mass Muscle	MCA < 10th percentile
4.- Dietary protein intake	nPCR <1.0 g / kg / day

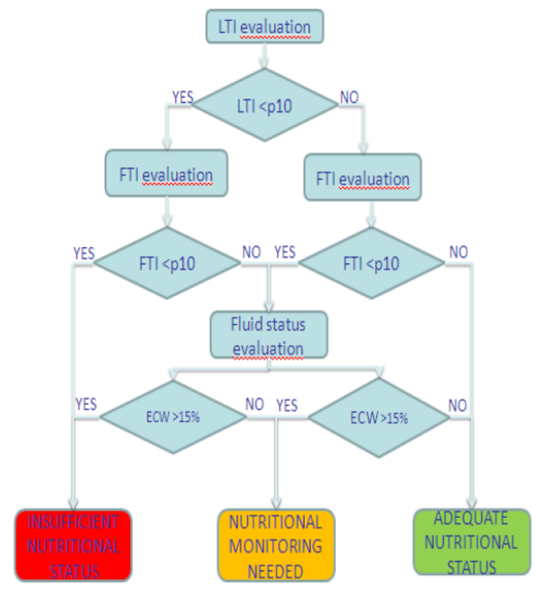

Figure 1

Results.

The average dry weight was 65.9 12.9 kg with an average Charlson index was 5 2, diabetes Mellitus 36.5%. Kt/Ve 2.94 0.82.

Table 2. Comparison of biochemical, anthropometric and bioimpedance parameters in patients with or without PEW

		WITHOUT PEW	WITH PEW	p-value
Albumin	Mean	38 ± 3	35 ± 3	0,012
Albumin (grouped)	≥ 37 mg/dl	56 (73,7%)	4 (26,7%)	
	< 37 mg/dl	20 (26,3%)	11 (73,3%)	0,001
Prealbumin (mg/dl)	Mean	30,5 ⊥ 7,32	21,99 ⊥ 6,57)	0,001
Prealbumin	Pre-alb ≥ 30 mg/dl	43 (56,6%)	1 (6,7%)	
	Pre-alb < 30 mg/dl	33 (43,4%)	14 (93,3%)	0,006
BMI	Mean	24,8 = 3,9	20,2 ± 2,5	<0.001
BMI (grouped)	≥ 23 kg/m^2	51 (67,1%)	2 (13,3%)	
	< 23 kg/m^2	25 (32,9%)	13 (86,7%)	0,001
MCA	Mean	23,8 = 2,5	19,7 ± 2,2	<0.001
DIF MCA (grouped)	≥ 0	68 (89,5%)	3 (20%)	
	< 0	8 (10,5%)	12 (80%)	<0.001
OH [L]	Mean	1,8 ⊥ 1,5	2,1 ⊥ 2	0,451
% Relative OH	Mean	9,98 ± 8,34	13,49 = 14,27	0,195
% Relative OH (grouped)	< 15%	55 (72,4%)	5 (33,3%)	
	≥15%	21 (27,6%)	10 (66,7%)	0,006
LTI [kg/m²]	Mean	11,91 = 2,6	11,33 ± 2,8	0,44
LTI_difference_to_reference [kg/m²]	Mean	-0,99 + 2,86	-1,57 + 3,66	0,495
FTI [kg/m²]	Mean	12,79 ± 4,55	8,65 = 3,15	0,003
FTI_difference_to_reference [kg/m²]	Mean	6,97 + 4,55	2,76 + 3,38	0,003
BCM [kg]	Mean	17,68 ⊥ 5,81	15,44 ⊥ 4,66	0,165
Phi Angle 50 kHz [ ]	Mean	4,48 ⊥ 0,96	3,98 _ 1,05	0,079
Phi Angle 50 kHz [ ] (grouped)	> 4	53 (69,7%)	7 (46,7%)	
	≤ 4	23 (30,3%)	8 (53,3%)	0,092

Patients classified with/without PEW and compared with a patient classification in adequate or inadequate nutritional status according to BCM and with data obtained with the MIS score are showed in (Table 3) .

Table 3. Combination of BCM evaluation, PEW presence and MIS score to identify patients requiring preferential nutritional intervention

	WITHOUT PEW		WITH PEW		
BCM EVALUATION	MIS < 5.0	MIS ≥5	MIS < 5.0	MIS ≥5	TOTAL
ADEQUATE NUTRITIONAL STATUS	14(15.3%)	9(9.9%)	0(0.0%)	5(5.5%)	28(26.3%)
NUTRITIONAL MONITORING NEEDED	17(18.7%)	9(9.9%)	2(2.2%)	11(12.1%)	41(42.9%)
INSUFFICIENT NUTRITIONAL STATUS	4(4.4%)	8(8.8%)	1(1.1%)	11(12.1%)	24(30.8%)
TOTAL	38.4%	28.6%	3.3%	29.7%	100.0%

We observed that combining these three elements, 12.1% of our patients requiring preferential nutritional intervention.

Model 1: Insufficient nutritional status detected by BCM, respect to be adequate or need monitoring (Figure 1) is an independent factor of poor prognosis of PEW.
Model 2: Considering also albumin <37 mg / dl, both could be considered independent predictors of risk for PEW.
Model 3: Dif_MCA <0 would take relevance as a prognostic factor of nutritional status assessed by bioimpedance, being arm assessment enough to prognostic evaluation of PEW.
Model 4: In this model the phase angle would not provide added predictive ability of PEW.

Table 4. Multivariate approach for the risk to develop PEW

Model	Factor	OR & 95% CI	p-value
1	Insufficient nutritional status (BCM)	6,1 (1,88; 19,8)	0,003
2	Insufficient nutritional status (BCM)	10,45 (2,4; 45,47)	0,002
	Albumin < 37 mg/dl	12,51 (2,78; 56,27)	0,001
3	Insufficient nutritional status (BCM)	2,93 (0,67; 12,7)	0,152
	Diferential MCA< 0	25,85 (5,77; 115,77)	<0,001
4	Insufficient nutritional status	5,59 (1,45; 21,49)	0,012
	Phase angle 50 kHz [º] ≤ 4	1,19 (0,31; 4,6)	0,796

Conclusions: Combining BCM, nutrition scores, biochemical and anthropometric parameters to calculate PEW allowed us to identify 12% of our patients requiring preferential nutritional intervention.