ESA RESISTANCE AND THE ROLE OF DIFFERENT MEASUREMENTS OF NUTRITION IN HEMODIALYSIS

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INTRODUCTION

Hyporesponsiveness to erythropoietin-stimulating agents (ESA) has been associated to increased mortality among patients with chronic kidney disease (CKD). High-dose ESA requirements are often associated with poor nutritional status and inflammation.
While traditional measurements of the nutritional status (brachial circumference, skinfolds, etc) requires an expert dietician, Body Cell Mass (BCM) measured with bioimpedance is an easier and more standardised method to assess nutritional and hydration status.
The aim of the study is to evaluate the relationship between ESA responsiveness and nutritional status measured by means of traditional anthropometry (brachial circumference, skinfolds, etc) or Body Cell Mass (BCM) measured with bioimpedance.

METHODS

Cross-sectional, observational study of 168 prevalent dialysis patients. We did not consider for the analysis 32 patients because they were in dialysis for less than 3 months, had major amputations, had incomplete nutritional assessment, had metastatic cancer or high C reactive protein values (>10 mg/dl).
Response to ESA was calculated using the ESA responsiveness index (ERI, EPO/Kg/weekly dose divided by HB (g/dl)). On the basis of the percentil distribution of ERI, we set a cut-off of 14.2 at the 75th percentile and defined as normoresponders patients with ERI less or equal to this value and hyporesponsives those with ERI>14.2.

RESULTS

136 patients (M/F: 83/53, HD/PD 111/25, mean age 68.19 ± 14.11 years) were available for the analysis. Among these, 31 (22.8%) were not treated with ESA at the time of nutritional assessment. Table 1 summarises the main anthropometric and laboratory data according to the ERI category. Table 2 shows the main findings between ERI category and nutritional assessment.

	ERI ≤ 14.2	ERI > 14.2	P-Value
N	74	26	
M/F	47/27	11/15	P = 0.05
AGE (years)	67.00 ± 13.98	68.16 ± 15.16	P = NS
Diabetes (n,%)	30 (30%)	9 (34.6%)	P = NS
IRON USE (n,%)	54 (74%)	19 (73,1%)	P = NS
Type of dialysis (HD/PD)	62/12	24/2	P = NS
Online HD (n,%)*	15 (24.2%)	8 (33.2%)	P = NS
Vascular access* -CVC -GRAFT -Fistula	 10 (16.1%) 5 (8.1%) 47 (75.8%)	 5 (20.8%) 6 (25%) 13 (54.2%)	P = 0.08
KT/V dp*	1.30 ± 0.24	1.39 ± 0.33	P = NS
URR*	68.84 ± 7.05	71.05 ± 8.40	P = NS
Hb (g/dl)	11.23 ± 1.40	10.13 ± 1.10	P = 0.001
S-ALBUMIN (g/l)	3.58 ± 0.50	3.32 ± 0.62	P = 0.038
PTH (ng/ml)	501.7 ± 466.9	497.5 ± 508.6	P = NS
TIME ON DIALYSIS (months)	50.82 ± 68.8	98.7 ± 106.4	P = 0.01
ESA DOSE (U/week/kg)	67.8 ± 33.0	264.5 ± 116.8	P < 0.0001
ERI	6.25 ± 3.39	26.64 ± 13.10	P < 0.0001
FERRITIN (ng/ml)	619.2 ± 890.0	890.0 ± 1549.7	P = NS
TSAT (%)	29.44 ± 13.52	27.95 ± 11.20	P = NS
CRP (mg/dl)	1.47 ± 1.81	2.32 ± 2.23	P = 0.07
25-VITAMIN D (ng/ml)	17.15 ± 6.72	16.39 ± 6.54	P = NS

Table 1: Anthropometric and laboratory data according to the ERI category

	ERI ≤ 14.2	ERI > 14.2	P-Value
BMI (Kg/m2)	26.13 ± 4.51	24.77 ± 4.58	P = NS
nPCR*	0.93 ± 0.23	0.85 ± 0.18	P = NS
REDUCTION OF LEAN BODY MASS (n,%)	22 (29.7%)	9 (34.6%)	P = NS
REDUCTION OF FAT BODY MASS (n,%)	41 (55.4%)	20 (76.9%)	P = 0.042
LTI (Kg/m2)	14.07 ± 3.43	13.93 ± 4.24	P = NS
FTI (Kg/m2)	11.11 ± 5.44	9.48 ± 4.28	P = NS

Table 2: Nutritional data according to ERI category

Figure 1 shows the relationship between ERI category and muscular and fat mass distribution.

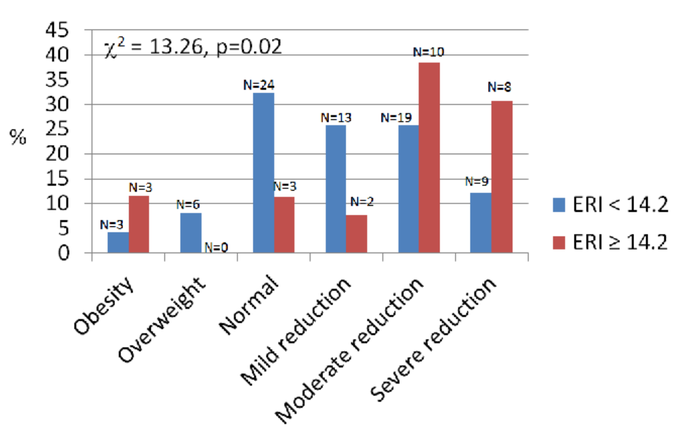

Figure 1A: ERI category and fat mass distribution

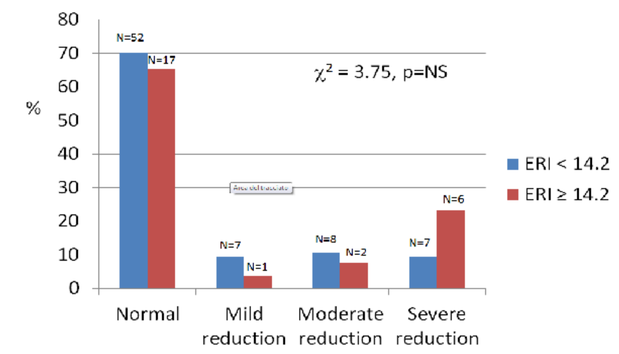

Figure 1B: ERI category and muscolar mass distribution

When analysing the relationship between the ln (ERI) and muscle and fat measurements by means of direct anthropometry, we found no association with muscle brachial area and total fat area (cm^2). At linear regression, the relationship between ln (ERI) and nutritional parameters measured with BCM was significant for Fat Tissue Index (FTI)(Kg/m^2)(R^2=0.044, B -0.037, P=0.042) but not for Lean Tissue Index (LTI) (Kg/m^2) (Figure 2).

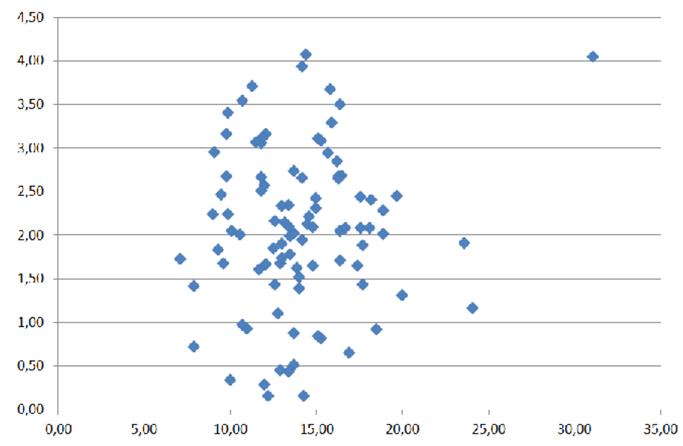

Figure 2A: lnERI and LTI [Kg/m^2]

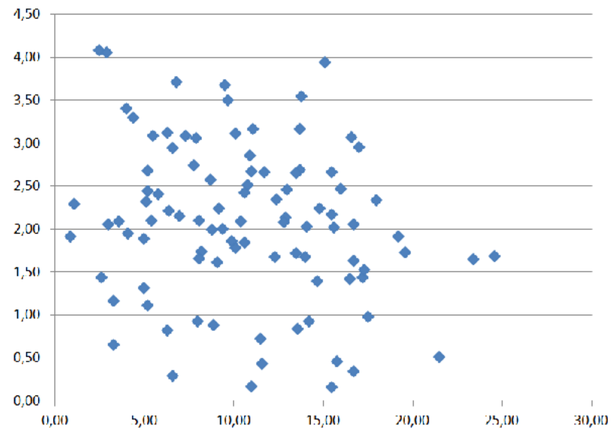

Figure 2B: lnERI and FTI [Kg/m^2]

CONCLUSIONS

In dialysis patients hyporesponse to ESA is associated with both indexes of malnutrition and inflammation. In iron-repleted patients, iron deficiency seems of less importance. Among nutritional measurements, only a decrease of fat body mass is associated with significant hyporesponse to ESA.

51ERA-EDTA
502--MP
M) Dialysis. M5) Anaemia in CKD 5D.
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