NEUTROPHİL TO LYMPHOCYTE AND PLATELET TO LYMPHOCYTE RATIO: NEW MARKERS OF INFLAMMATION IN CHRONIC HAEMODIALYSIS PATIENTS

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Objectives:

Neutrophil-to-Lymphocyte Ratio (NLR) and Platelet-to-Lymphocyte Ratio (PLR) are two new potential markers to determine inflammation in end-stage renal disease (ESRD) patients. The association between malnutrition, inflammation and appetite with PLR and NLR are lacking in chronic hemodialysis (HD) patients. Hence, we aimed to determine the relationship between PLR and NLR with nutrition, inflammation and appetite in ESRD patients on maintenance hemodialysis.

Methods:

One-hundred patients receiving HD for ≥3 months in the dialysis unit of Sisli Etfal Research and Educational Hospital were enrolled in this cross-sectional study. To minimize the confounding effects of residual renal function we studied only anuric patients. The exclusion criterias were hospitalizations, major surgery, obvious infections or inflammatory disease within the preceding 3 months, end stage liver disease, metastatic malignancies, malabsorbsion syndromes. To determine nutrition and inflammation status; dry weight, body mass index (BMI), triceps scinfold thickness (mm), malnutrition inflammation score (MIS), serum albumin, prealbumin, hs-CRP and TNF-α levels were obtained from all patients. Patients were classified into 3 groups according to the malnutrition inflammation score levels: Group 1 (MIS ≤ 2), group 2 (MIS: 2-8) and group 3 (MIS > 8).

Table 1. Demographic, clinical, anthropometric and laboratory data of patients.

	MIS ≤ 2 (n=9)	MIS 2-8 (n=64)	MIS ≥ 8 (n=27)	P
Demographics				
Age (y)	44.0±22.5	51.9±16.5	55.9±17.5	NS
Sex (male/female)	6/3	32/32	14/13	NS
Duration on HD (months)	21.2±20.9	79.2±70.5	65.3±50.2	*0.035*
Dry weight (kg)	68.7±22.6	63.1±13.5	54.1±12.1	*0.008*
Body mass index (kg/m²)	25.4±5.5	24.2±4.3	20.7±4.3	*0.002*
Etiology of ESRD				
Diabetic nephropathy	3	20	8	
Hypertensive nephropathy	2	16	6	
Chronic glomerulonephritis	2	15	7	NS
Others	1	9	4	
Undetermined	1	4	2	
Delivered dose of dialysis				
spKt/V	1.50±0.21	1.59±0.32	1.61±0.36	NS
Anthroponetry				
Triceps skinfold thickness (mm)	16.5±6.8	15.7±6.4	10.8±5.4	*0.002*
Laboratory data				
Predialysis urea (mg/dl)	150.2±38.6	141.8±28.7	124.5±28.5	*0.020*
Predialysis creatinine (mg/dl)	9.6±3.0	9.2±2.1	7.6±1.8	*0.004*
Hemoglobin (g/dl)	10.4±0.8	10.6±1.7	10.1±1.6	NS
Ca (mg/dl)	9.1±0.9	8.7±0.8	8.4±1.0	NS
P (mg/dl)	6.6±1.7	5.6±1.2	5.1±1.6	*0.015*
CaxP	61±18.4	49.1±11.7	44±15.8	*0.008*
intact PTH (pg/ml)	599±750.5	584.6±612.4	674.7±875.7	NS
Total cholesterol (mmol/L)	179.6±33.4	178.1±40.3	168.4±44.6	NS
Triglyceride (mmol/L)	170.8±87.1	169.8±81.1	151.4±110.9	NS

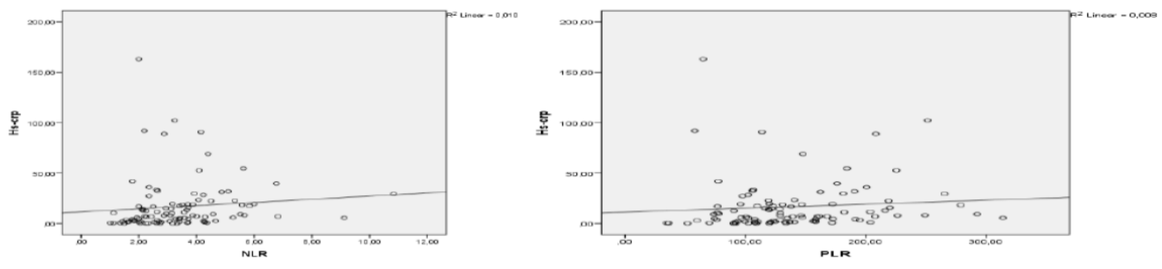
***Table 2.** Nutrition, appetite and inflammation parameters of groups.*

	MIS ≤ 2 (n=9)	MIS 2-8 (n=64)	MIS ≥ 8 (n=27)	P
Nutrition				
Albumin (g/L)	4.1±0.3	3.9±0.2	3.5±0.5	*0.001*
Prealbumin (mg/dl)	37.4±12.1	29.5±8.3	24.7±5.5	*0.001*
TIBC (g/L)	244.7±38.7	214.3±41.9	190.6±34.1	*0.001*
Appetite				
Leptin (ng/dL)	11.8±14.6	11.6±12.5	7.5±10.9	NS
Corrected Leptin (Leptin/BMI)	0.40±0.39	0.44±0.45	0.31±0.39	NS
Inflammation				
hsCRP (mg/L)	9.9±13.1	16.0±23.5	20.8±32.2	NS
TNF-alfa (pg/mL)	20.4±6.2	23.9±9.0	21.5±5.5	NS
Ferritin (ng/ml)	676.5±354.6	653.3±434.1	832.1±553.1	NS
Neutrophil-lymphocyte ratio	2.35±1.01	3.34±1.50	3.72±1.88	NS
Platelet-lymphocyte ratio	84.7±38.9	141.8±54.1	150.4±56.0	*0.007*

***Table 3.** Correlation analyse of NLR and PLR.*

	NLR		PLR	
	p	r	p	r
Age (years)	NS	+0.137	NS	+0.192
Duration on HD (months)	NS	-0.131	NS	+0.049
Diabetes Mellitus	NS	-0.010	NS	+0.110
spKt/V	NS	-0.098	NS	-0.092
Albumin	NS	-0.155	NS	-0.181
Prealbumin	NS	-0.170	NS	-0.159
MIS	NS	+0.106	NS	+0.050
hsCRP (mg/L)	*0.001*	*+0.333*	*0.008*	*+0.262*
TNF-alpha (pg/mL)	NS	+0.023	NS	+0.072
Transferrin saturation (%)	*0.001*	*-0.418*	*0.002*	*-0.309*
Ferritin (ng/ml)	NS	-0.082	NS	-0.046

Figure 1. Correlation graphics of NLR and PLR with hs-CRP.



Results:

Mean age of 100 patients (Male/Female: 52/48) were 52.3 17.4 years. Group 1, group 2 and group 3 consisted of 9, 64, 27 patients, respectively. Mean duration time on HD were less in group 1 (p= 0.035). There were no differences regarding age, gender, ethiology of ESRD, delivered dialysis dose between the groups. As expected, Group 3 patients had lower dry weight (p= 0.008), BMI (p= 0.002), triceps scinfold thickness (p= 0.002), predialysis serum urea (p= 0.020), creatinine (p= 0.004), phosphorus (p= 0.015), prealbumin (p= 0.001), albumin (p= 0.001), TIBC (p= 0.001) which means worse nutritional status. There were no significant difference between 3 groups considering leptin, leptin/BMI, hs-CRP, TNF-α and NLR, but PLR was founded significantly higher in group 3 compared to group 1 (p= 0.007). NLR and PLR were positively correlated with hs-CRP (p= 0.001, r= +0.333 and p= 0.008, r= +0.262, respectively) and negatively correlated with serum transferrin saturation (%) (p= 0.001, r= -0.418 and p= 0.002, r= -0.309, respectively). There were no significant corellation between NLR and PLR with serum leptin levels.

Conclusions:

We conclude that NLR and PLR could use as new biomarkers for assessing inflammation in patients on maintenance hemodialysis. In addition, PLR seems to be associated with malnutrition.

References:

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DOI: 10.3252/pso.eu.51era.2014
Poster presented at: 51 ERA-EDTA CONGRESS AMSTERDAM THE NETHERLANDS MAY 31 JUNE 3 2014