



Relationships of Total Lymphocyte Count and Subpopulation Lymphocyte Counts with the Nutritional Status in Patients Undergoing HD/PD

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Background

Dialysis patients' nutritional indicators are quite subjective and complex and cannot be easily measured in clinical settings. Based on previous reports that total lymphocyte count (TLC) and subpopulation lymphocyte counts (SLCs) are associated with nutritional status in patients with dialysis, we designed this study to examine the relationships of the TLC and SLCs with clinical outcome and nutritional status in patients undergoing maintenance hemodialysis (HD) and peritoneal dialysis (PD).

Methods

In this prospective, observational study, we enrolled 66 patients (50 HD patients and 16 PD patients) receiving stable maintenance dialysis. We evaluated the baseline parameters of height; weight; TLC; SLCs expressing CD3, CD4, CD8 and CD19; CBC; iron profile (iron, TIBC, ferritin); BUN; Cr; Na; K; total CO₂; Ca; P; iPTH; total protein; albumin; total cholesterol; HDL; LDL; uric acid and CRP and calculated Onodera's prognostic nutritional index (OPNI) and the Geriatric Nutritional Risk Index (GNRI) at base line and three months. To analyze differences in the TLC and SLCs between the HD group and the PD group, we performed an independent samples t-test. Logistic regression analysis was performed to predict malnutrition in dialysis patients. In addition, to analyze changes in TLC, SLCs expressing each marker (CD3, CD4, CD8 and CD19) and other nutritional markers, we performed general linear model (GLM)-repeated measures ANOVA.

Results

Logistic regression analysis revealed that patients aged 60 years or older, women, and those whose CD19 SLCs were lower than 100 had a higher risk of developing malnutrition. The period of dialysis and OPNI were significantly shorter and higher, respectively, in patients with CD19 SLCs > 100. In GLM-repeated measures ANOVA, CD19 SLCs were significantly higher in women and in patients with a shorter period of dialysis

TABLES

Table 1. Clinical characteristics of 66 dialysis patients according to methods of dialysis after 3 month

Variables	HD (n=50)	PD (n=16)	P value
Age	55.8 ± 12.7	49.8 ± 14.5	0.127
Sex (Male/Female)	28/22	10/6	0.774
DM	18 (36%)	7 (43.8%)	0.768
Duration of dialysis (months)	59.7 ± 52.9	66.1 ± 33.6	0.653
Body Mass Index	21.1 ± 2.5	23.8 ± 4.1	0.032
GNRI	99.5 ± 7.7	96.2 ± 9.2	0.184
OPNI	46.1 ± 4.5	38.4 ± 5.6	0.035
Systolic blood pressure (mmHg)	138.0 ± 31.4	133.7 ± 24.1	0.568
Diastolic blood pressure (mmHg)	80.6 ± 16.6	80.8 ± 11.8	0.972
Kt/V	1.76 ± 0.25	1.86 ± 0.37	0.263
Urea Reduction Rate (%)	76.0 ± 4.9	NA	NA
Neutrophil Lymphocyte Ratio	0.43 ± 0.15	0.60 ± 0.22	0.139
TLCs (/mm ³)	1520 ± 526	1386 ± 697	0.570
CD3 count (/mm ³)	1023 ± 428	905 ± 464	0.365
CD4 count (/mm ³)	644 ± 296	627 ± 281	0.845
CD8 count (/mm ³)	372 ± 169	380 ± 181	0.881
CD19 count (/mm ³)	125 ± 81	112 ± 63	0.541
CD4/CD8 ratio	1.8 ± 0.7	0.7 ± 0.6	0.638

GNRI : Geriatric Nutritional Risk Index

OPNI : Onodera's prognostic nutritional index

Kt/V : Dialysis adequacy

TLCs : Total lymphocyte counts

NA : Not Applicable

TABLES

Table 2. Logistic regression for predicting malnutrition according to GNRI 100 at start of the study

Variable	OR (95% CI)	P value
Age > 60 years	10.783(1.936-60.059)	0.007
Female	2.115(0.752-9.194)	0.255
PD	3.159(0.338-29.533)	0.313
Duration of dialysis (months) > 60	0.705(0.136-3.657)	0.677
DM	1.507(0.342-6.633)	0.588
Total Lymphocyte Counts (/mm ³) < 1500	0.473(0.113-1.972)	0.304
CD3 count(/mm ³) < 1000	0.598(0.040-8.996)	0.711
CD4 count(/mm ³) < 600	0.969(0.176-5.329)	0.971
CD8 count(/mm ³) < 350	3.509(0.331-37.193)	0.297
CD19 count(/mm ³) < 100	9.202(1.481-57.191)	0.017

Table 3. Clinical characteristics of 66 dialysis patients according to CD19 count at start of the study

Variables	CD19 ≥ 100 (n=41)	CD19 < 100 (n=25)	P value
Age	55.1 ± 13.7	53.1 ± 12.7	0.565
Sex (Male/Female)	21/20	17/8	0.208
DM	15 (36.6%)	10 (40%)	0.799
HD/PD	32/9	18/7	0.768
Duration of dialysis (months)	50.6 ± 37.7	78.8 ± 59.6	0.022
Body Mass Index	21.4 ± 2.9	22.3 ± 3.5	0.511
GNRI	101.2 ± 8.0	97.9 ± 8.4	0.121
OPNI	47.2 ± 5.1	44.4 ± 4.8	0.045
Systolic blood pressure (mmHg)	131.8 ± 30.6	145.4 ± 26.5	0.062
Diastolic blood pressure (mmHg)	78.2 ± 17.6	84.7 ± 10.2	0.065
Kt/V	1.74 ± 0.29	1.70 ± 0.22	0.504
Neutrophil Lymphocyte Ratio	0.42 ± 0.15	0.41 ± 0.15	0.931
TLCs (/mm ³)	1525 ± 586	1537 ± 513	0.933
CD3 count (/mm ³)	1129 ± 406	796 ± 256	0.001
CD4 count (/mm ³)	701 ± 262	488 ± 169	0.001
CD8 count (/mm ³)	426 ± 177	302 ± 127	0.002
CD19 count (/mm ³)	176 ± 74	57 ± 26	0.001
CD4/CD8 ratio	1.7 ± 0.7	1.7 ± 0.7	0.905

GNRI : Geriatric Nutritional Risk Index

OPNI : Onodera's prognostic nutritional index

Kt/V : Dialysis adequacy

TLCs : Total lymphocyte counts

Table 4. CD19 count by several variables

Variables	Baseline	3 months	P value*
Age			
Age ≥ 60years (n=28)	135 ± 93	126 ± 80	0.206
Age < 60 years (n=38)	128 ± 77	118 ± 73	0.206
P value*	0.709	0.709	
Sex			
Male (n=38)	114 ± 63	111 ± 66	0.146
Female (n=28)	154 ± 103	135 ± 87	0.146
P value*	0.043	0.043	
Dialysis			
Hemodialysis (n=50)	132 ± 85	124 ± 80	0.179
Peritoneal Dialysis (n=16)	127 ± 84	111 ± 61	0.179
P value*	0.666	0.666	
Duration of dialysis			
Duration ≥ 60months(n=30)	106 ± 78	94 ± 55	0.190
Duration < 60 months (n=36)	152 ± 78	144 ± 84	0.190
P value*	0.009	0.009	
DM			
Yes (n=25)	118 ± 68	116 ± 61	0.294
No (n=41)	139 ± 92	124 ± 84	0.294
P value*	0.449	0.449	

*P-values by treatment period obtained from linear model using repeated measured ANOVA

+P-values by content obtained from linear model using repeated measured ANOVA

Conclusions

Our results indicate that TLC and SLCs (especially CD19 count) may be significant nutritional markers in HD and PD patients

