PERITONEAL OR HEMODIALYSIS - DIALYSIS VINTAGE DEPENDENT COMPARISON OF BODY COMPOSITION, HYDRATION AND NUTRITION

Krzysztof Hoppe[1], Krzysztof Schwermer[1], Anna Kawka[1], Patrycja Klysz[1], Ewa Baum[1], Dorota Radziszewska[1], Bengt Lindholm[2], Krzysztof Pawlaczyk[1,2], Andrzej Oko[1]

[1]Department of Nephrology, Transplantology and Internal Medicine, Poznań University of Medical Sciences, Poznań, Poland
[2]Baxter Novum and Renal Medicine, Deptartment of Clinical Science, Intervention and Technology, Karolinska Institutet, Stockholm, Sweden

OBJECTIVES

The aim of the study was to compare selected indicators of body composition, hydration, and nutritional state between maintenance peritoneal (PD) and hemodialysis (HD) patients who were stratified according to dialysis vintage (DV).

Furthermore, the relationship between these factors, markers of inflammation, and associations with CV-related mortality and all-cause mortality were also analyzed.

METHODS

- The study investigated a group of 359 patients who were followed-up after 24 months. 301 patients were undergoing maintenance hemodialysis (group H) and 58 patients had peritoneal dialysis (group P).
- Each main group was divided into three subgroups depending on the DV.
- Subgroups HA and PA received dialysis for less than 104 weeks (2 years);
- Subgroups HB and PB had dialysis treatment for 104-208 weeks (2-4 years);
- Subgroups HC and PC had DV exceeding 208 weeks (4 years).
- History included: residual daily diuresis (diuresis), diabetes mellitus (DM), and on end-points featuring death, renal transplantation, conversion to another type or disqualification from dialysis. The cause of death was specified as CV or non-CV.
- Mean blood pressure (MBP) and Whole-Body Multiple-Frequency BIA using Fresenius Body Composition Monitor were performed. BIA parameters featured an overhydration to total body weight ratio (OH), Body Mass Index (BMI), Lean Tissue Mass (LTM) and Fat Tissue Mass (FAT).
- SGA questionnaire was performed to assess the nutritional condition and severity of comorbidities. Serum analysis featured: hemoglobin (Hb), albumin (alb), high sensitivity C-reactive protein (CRP) and total cholesterol (Tchol).

RESULTS

	H	P	p
Age, years	**64±15**	**56±17**	**<0.001**
Patients, n	301	58	
Males / females, n	**190/111**	**28/30**	**<0.05**
Dialysis vintage, weeks	**264±216**	**135±96**	**<0.001**
Comorbidity and deaths			
DM, n	95	19	NS
Deaths all-cause, n	**89**	**6**	**<0.01**
Deaths cardiovascular, n	**44**	**5**	**<0.001**
Investigated predictors			
Hb, g/dl	**10.9±1.5**	**11.9±1.6**	**<0.001**
Albumin, g/dl	3.9±0.5	3.9±0.5	NS
CRP, mg/l	16.3±35.5	9.6±12.4	NS
TChol, mg/dl	**177.3±49.4**	**198.1±42.0**	**<0.001**
SGA, pts	9.2±3.1	8.7±1.8	NS
Diuresis, ml	**901±777**	**1500±922**	**<0.001**
MBP, mmHg	101.1±14.7	98.9±13.1	NS
Weight, kg	73.3±15.9	75.7±16.3	NS
BMI, kg/m2	26.4±4.9	26.2±5,4	NS
LTM, %	45.5±13.2	48.6±14.0	NS
FAT, %	35.0±11.1	35.5±10.0	NS
OH, %	**10.9±4.1**	**2.0±3.1**	**<0.001**

	HA	PA	p
Age, years	**65.5±18.5**	**50.9±17.1**	**<0.01**
Patients, n	41	28	
Males /females, n	26/15	12/16	NS
Dialysis vintage, weeks	66.4±26.6	57.0±26.7	NS
Comorbidity and deaths			
DM , n	15	7	NS
Deaths all-cause , n	**28**	**1**	**<0.001**
Deaths cardiovascular , n	**15**	**1**	**<0.01**
Investigated predictors			
Hb, g/dl	**10.6±1.5**	**11.8±1.7**	**<0.05**
Albumin, g/dl	3.8±0.5	3.9±0.5	NS
CRP, mg/l	31.7±57.3	10.6±14.6	NS
TChol, mg/dl	**180.2±47.0**	**211.7±46.3**	**<0.05**
SGA, pts	10.5±3.9	8.6±2.3	NS
Diuresis, ml	**871±729**	**1695±960**	**<0.001**
MBP, mmHg	95.9±11.2	101.6±14.7	NS
Weight, kg	**74.5±15.1**	**66.5±13.5**	**<0.05**
BMI, kg/m2	26.2±4.7	24.5±5.00	NS
LTM, %	**46.5±12.9**	**53.8±14.4**	**<0.05**
FAT, %	35.7±9.9	31.5±10.0	NS
OH, %	**8.0±4.3**	**1.6±3.1**	**<0.001**

	HB	PB	p
Age, years	62.7±16.3	57.8±17.3	NS
Patients , n	111	17	
Males/females, n	66/45	8/9	NS
Dialysis vintage , weeks	149.7±29.2	148.9±33.2	NS
Comorbidity and deaths			
DM, n	33	7	NS
Deaths all-cause, n	23	2	NS
Deaths cardiovascular, n	12	1	NS
Investigated predictors			
Hb, g/dl	**10.8±1.5**	**11.9±1.4**	**<0.01**
Albumin, g/dl	3.8±0.6	3.9±0.4	NS
CRP, mg/l	**18.5±44.9**	**4.7±5.7**	**0.083**
TChol, mg/dl	181.3±62.2	189.5±36.0	NS
SGA, pts	9.9±4.0	8.7±1.2	NS
Diuresis, ml	1025±808	1361±884	NS
MBP, mmHg	**104.7±15.1**	**96.9±11.7**	**<0.05**
Weight, kg	76.6±17.0	75.3±15.2	NS
BMI, kg/m2	26.7±5.5	26.8±4.9	NS
LTM, %	46.7±15.0	48.2±13.7	NS
FAT, %	35.6±11.6	36.0±9.5	NS
OH, %	**11.7±5.9**	**2.1±3.2**	**<0.001**

	HC	PC	p
Age, years	64.4±13.8	63.7±13.1	NS
Patients, n	149	13	
Males / females, n	98/51	5/8	NS
Dialysis vintage, weeks	403.7±232.0	285.5±44.5	NS
Comorbidity and deaths			
DM, n	47	5	NS
Deaths all-cause, n	38	3	NS
Deaths cardiovascular, n	17	3	NS
Investigated predictors			
Hb, g/dl	12.0±1.6	12.0±1.6	0.068
Albumin, g/dl	4.0±0.4	3.8±0.5	NS
CRP, mg/l	13.5±26.8	16.1±13.1	NS
TChol, mg/dl	175.0±42.8	181.3±32.3	NS
SGA, pts	8.9±2.7	8.8±1.1	NS
Diuresis, ml	832±765	1261±863	0.066
MBP, mmHg	100.2±14.9	95.6±10.4	NS
Weight, kg	74.5±14.2	81.3±21.2	NS
BMI, kg/m2	26.2±4.5	29.0±5.9	0.066
LTM, %	**44.3±11.7**	**38.6±7.9**	**<0.05**
FAT, %	**34.4±11.1**	**42.8±6.4**	**<0.01**
OH, %	3.1±2.8	2.4±3.3	NS

Parameter	r	p
All-cause mortality analysis		
HD+PD		
Alb	**-0.20**	**<0.05**
Hb	**-0.17**	**<0.05**
CRP	**0.17**	**<0.05**
SGA	**0.18**	**<0.05**
LTM	**-0.14**	**<0.05**
OH	**0.17**	**<0.05**
Diuresis	**-0.23**	**<0.05**
HD		
Alb	**-0.20**	**<0.05**
Hb	**-0.17**	**<0.05**
CRP	**0.18**	**<0.05**
SGA	**0.18**	**<0.05**
LTM	**-0.13**	**<0.05**
OH	**0.14**	**<0.05**
Diuresis	**-0.20**	**<0.05**
PD		
Alb	**-0.32**	**<0.05**

Parameter	r	p
Cardio-vascular mortality analysis		
HD+PD		
Alb	**-0.18**	**<0.05**
SGA	**0.15**	**<0.05**
LTM	**-0.17**	**<0.05**
FAT	**0.13**	**<0.05**
OH	**0.13**	**<0.05**
Diuresis	**-0.19**	**<0.05**
HD		
Alb	**-0.17**	**<0.05**
LTM	**-0.13**	**<0.05**
FAT	**0.13**	**<0.05**
Diuresis	**-0.17**	**<0.05**
PD		
Alb	**-0.31**	**<0.05**
SGA	**0.32**	**<0.05**

CONCLUSIONS

- Body composition in ESRD patients on maintenance dialysis features markers of nutrition and hydration that depend on dialysis modality and vintage. Globally, patients undergoing HD are affected by higher fluid overload, which is connected with lower residual daily diuresis.
- Patients on maintenance PD for less than 104 weeks present significantly better hydration balance and nutritional state, which is reflected in a lower mortality rate. Longer lasting PD effaces these differences.
- Patients undergoing dialysis for over 208 weeks have similar degree of fluid overload in PD and HD whereas the HD recipients' body composition shows a higher percentage of more favorable LTM.
- Nevertheless, these disproportions are dependent on the patients' age, general condition and comorbidities. Thus, the precise influence of dialysis modality on body composition is difficult to determine.
- No reliable single factor of nutritional condition assessment was proposed.

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Krzysztof Hoppe
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