

REMOVAL OF INDOXYL SULPHATE AND P-CRESOL SULPHATE AS WELL AS STIMULATION OF FORMING PROTEOLYTIC ENZYMES DURING LOW-FLUX (HDLF), HIGH-FLUX HEMODIALYSIS (HDHF) AND HEMODIAFILTRATION (HDF)

MALGORZATA GOMOLKA¹, Longin B. Niemczyk², Jerzy Smoszna¹, Katarzyna Szamotulska³, Leszek Paczek⁴, Stanislaw Niemczyk¹

¹ - Military Institute of Medicine, Department of Internal Diseases, Nephrology and Dialysis Therapy, Warsaw, POLAND,

² - Warsaw Medical University, Department of Nephrology, Internal Diseases and Dialysotherapy, Warsaw, POLAND,

³ - Institute of Mother and Child, Department of Epidemiology, Warsaw, POLAND,

⁴ - Warsaw Medical University, Department of Immunology, Transplantology and Internal Diseases, Warsaw, POLAND.

INTRODUCTION AND AIMS:

In hemodialysis patients proteolytic enzymes and protein-bound solutes (PBS) lead to the activation of oxidative stress and inflammation causing an accelerated development of atherosclerosis. **Aims** 1. Comparison of proteolytic enzymes activity (cathepsin B, collagenase) and PBS concentrations (indoxyl sulphate and p-cresol sulphate) before and after single HDLF, HDHF and HDF procedures 2. The assessment of influence of 8-week therapy by these methods on above-mentioned markers

METHODS

METHODS: 21 patients (8F, 13M) were included and 19 completed the study. The age of the patients was 54 years \pm 14,5 (29,7-71,8), BMI- 28 \pm 6,6. The mean period of hemodialysotherapy was 20,7 \pm 15,5 (3,7 - 61) months. The study lasted for 24 weeks and consisted of 3 consecutive stages (S). Each stage lasted for 8 weeks: stage 1 (S1)-HD (LOPS low-flux Braun dialyzers), stage 2 (S2)-HD (HIPS high-flux Braun dialyzers), stage 3 (S3)- HDF with post-dilution (HIPS Braun filter). The activities of collagenase, cathepsin B (Bachem) were marked by fluorimetric method and the concentrations of indoxil sulphate and p-cresol sulphate) using HPLC method (Merck).

RESULTS

The results of the study are presented in tables 1 and 2. Lower median p-cresol values and stable values of indoxin sulphate after 8-week hemodiafiltration were observed (consecutive values for p-cresol sulphate: before the first HDLF - 45,0, after HDLF cycle before the first HDHF 40,7, after HDHF cycle before the first HDF -36,2, after HDF cycle-27,1).

Table 1. Changes of PBS concentrations after different dialysis types

		Indoxin sulphate			p-cresol sulphate		
		N	mean +/- SD	median [min. - max.]	N	mean +/- SD	median [min. - max.]
HDLF	1	18	25,1 +/- 11,2	23,4 [2,3-45]	18	45,3 +/- 19,1	43,6 [21,2-92,9]
	2	18	19 +/- 8,6	18,6 [1,9-34,3]	18	36,8 +/- 14,5	34,6 [16,7-63,4]
	Δ	18	-6,1 +/- 4,5	-6 [(-13,4)-4,8]	18	-8,5 +/- 7,8	-7,4 [(-29,5)-5,4]
	p	<0,001			<0,001		
HDHF	1	18	23,9 +/- 12	20,2 [1,5-49,7]	18	41,9 +/- 21,5	39,9 [14,3-93,8]
	2	18	17,3 +/- 8,6	16,8 [1,6-33,5]	18	33,4 +/- 15,5	31,4 [9,9-60,9]
	Δ	18	-6,6 +/- 4,8	-5,6 [(-16,2)-0,1]	18	-8,6 +/- 10,4	-4,8 [(-41,8)-1,9]
	p	<0,001			<0,001		
HDF	1	18	24,7 +/- 10,3	25,1 [2,6-42,2]	18	38,5 +/- 22	39,1 [0,1-85]
	2	18	16,2 +/- 7,9	13,9 [2,1-31]	18	28,7 +/- 19,2	26,3 [0,3-73,6]
	Δ	18	-8,5 +/- 4,5	-8,2 [(-16,7)-(-0,5)]	18	-9,7 +/- 6,1	-8,8 [(-26,6)-0,2]
	p	<0,001			<0,001		
p	HDLF vs HDHF	0,89			0,899		
	HDLF vs HDF	0,105			0,932		
	HDHF vs HDF	0,072			0,132		

Table 2. Changes of proteolytic enzymes (cathepsin B, collagenase) activity

		Collagenase			Cathepsin B		
		N	mean +/- SD	median [min.-max.]	N	mean +/- SD	median [min.-max.]
HDLF	1	19	10,2 +/- 6,7	8,5 [5,1-32,4]	19	14,8 +/- 3,7	13,9 [9,9-24,5]
	2	19	10,5 +/- 7,3	9,1 [3-38]	19	14,7 +/- 3,6	14,1 [10-23,3]
	Δ	19	0,4 +/- 3,8	0,8 [(-13,8)-5,6]	19	-0,1 +/- 1,6	-0,2 [(-2,3)-4,8]
	p	0,041			0,496		
HDHF	1	19	9,6 +/- 6,4	7,7 [4,8-30,4]	19	15,1 +/- 3,6	15 [9,8-21,8]
	2	19	10,1 +/- 6,9	8,8 [3,8-35,2]	19	13,1 +/- 3,5	13 [4,7-21,5]
	Δ	19	0,5 +/- 4,2	0,6 [(-15,1)-4,8]	19	-2,1 +/- 3,1	-2 [(-9,7)-3,6]
	p	0,053			0,006		
HDF	1	19	9,6 +/- 7,4	7,7 [4,7-38,3]	19	14,7 +/- 3,6	14,2 [8,6-22,8]
	2	19	10,7 +/- 8	9,3 [5,1-41,8]	19	13,8 +/- 4,8	14,1 [0,1-23,9]
	Δ	19	1,1 +/- 1,8	1,2 [(-2,9)-3,5]	19	-0,9 +/- 3,2	-0,3 [(-10,7)-3,2]
	p	0,013			0,307		
p	HDLF vs HDHF	1			0,012		
	HDLF vs HDF	0,716			0,153		
	HDHF vs HDF	0,716			0,179		

CONCLUSIONS

1. Single HDLF, HDHF and HDF procedures are similarly effective in removing PBS.
2. A tendency for more effective elimination of p-cresol sulphate during 8-week HDHF therapy was observed.
3. A similar stimulation of collagenase formation during all 3 types of therapies and decreased concentrations of cathepsin B after HDF (lower stimulation or more effective elimination ?) were found.

