THE ASSOCIATION BETWEEN INFLAMATION, OXIDATIVE STRESS AND CADMIUM LEVELS IN DIALYSIS PATIENTS

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OBJECTIVES

It is speculated that serum cadmium levels are increased in hemodialysis (HD) population due to the exposure of large volumes of water which has been linked to inflammation, malnutrition and endothelial dysfunction. The aim of this study was to investigate the association between serum cadmium levels, inflamation and oxidative stress in end stage renal disease patients under two types of dialysis; including peritoneal dialysis and hemodialysis.

METHODS

Thirty two HD, 30 peritoneal dialysis (PD) and 23 healthy controls were included. Patients who have diabetes mellitus, malignancy, active inflammatory disease or any infection and smokers were excluded. We investigated hs-CRP , IL-6, MDA and AOPP levels in all subjects to detect the absence or presence of inflammation. Serum levels of cadmium were measured in all three groups.

RESULTS

No difference was found between three groups regarding to age and body mass index. Serum HDL cholesterol levels were significantly lower in both dialysis population compared to the healthy controls, whereas no difference was observed about total and LDL cholesterol levels between groups. Serum cadmium concentrations were similar in all three groups. The serum levels of IL-6, hs-CRP and AOPP were significantly higher in dialysis population compared to the controls (p<0.001). However, no significant difference was found between PD and HD groups. Serum MDA level was significantly higher in PD patients compared to the HD and control subjects (p<0,001). Although, HD patients tend to have higher MDA levels than control group, it did not reach statistically significance. In each dialysis population spearman analyses showed no significant correlation between cadmium levels with inflamatory (Figure 1) and oxidative stres parameters (Figure 2).

	Hemodialysis (n=32)	P eritoneal dialysis (n=30)	Control (n=23)	P
Age (years)	42,7±16,9	44,1±14,8	44,8±10,9	0,86
Gender (Male %)	71,9	70,0	52,2	0,26
BMI (kg/m2)	23,09±3,30	24,83±4,86	26,35±3,87 †	0,016
Total Cholesterol (mg/dl)	167,53±37,52	182,83±29,64	198,96±41,01 †	0,008
LDL (mg/dl)	93,79±29,03	111,20±23,98	126,97±35,74 †	<0,001
HDL (mg/dl)	33,50(28-44,75)	33,50(29-42,5)	44(37-56) † ‡	<0,001
Triglyceride (mg/dl)	156,00(91-193,75)	136,50(105,50-187,25)	105,0(83-140)	<0,17
Hs-CRP (mg/dl)	0,60(0,26-1,12)	1,31(0,19-1,31)	0,13(0,08-0,28) † ‡	<0,001
IL-6 (pg/ml)	20,67(18,52-25,07)	21,38(17,93-27,81)	15,19(14,24-16,14) † ‡	<0,001
MDA (nmol/ml)	12,57(11,28-13,98) £	15,77(12,57-20,81)	11,53(10,27-15,41) ‡	<0,001
AOPP (µmol/L)	304,75(205,64-534,47)	272,09(213,80-363,55)	159,8(111,3-194,0) † ‡	<0,001
Cadmium (ug/L)	2,23±0,63	2,12±0,55	2,29±0,88	0,65
Uric Acid (mg/dl)	5,43±1,07	5,41±0,78	4,27±0,85 † ‡	<0,001

BMI: Body Mass Index, AOPP:advanced oxidation protein products MDA:malondialdehyde
IL-6: Interleukine-6 , hs-CRP: High sensitivity C- reactive protein
£: hd vs pd p<0,05 †:hd vs control p<0,05 ‡:pd vs control p<0,05

Figure 1

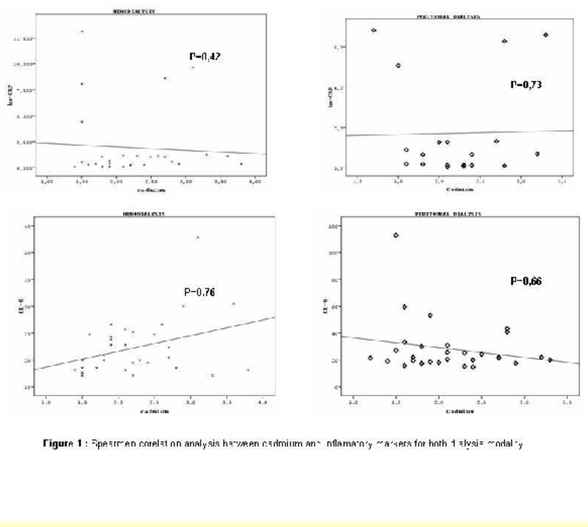

Figure 1 : Spearman correlation analysis between cadmium and inflamatory markers for both dialysis modality

Figure 2

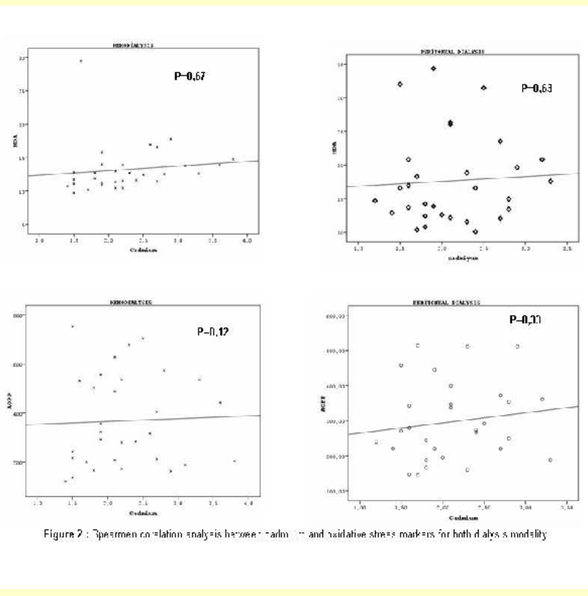

Figure 2 : Spearman correlation analysis between cadmium and oxidative stress markers for both dialysis modality

CONCLUSIONS

This is the first study which analyse the association between serum cadmium levels, inflammation and oxidative stress in dialysis population by including both HD and PD modalities. Raised blood cadmium levels were observed in maintenance heamodialysis patients in previous studies. In our study, serum cadmium levels were similar in both dialysis population and control groups. The analytical results presented in this study demonstrated that, there was no association between blood Cd levels and inflammation status in both maintenance HD and PD patients. Our results suggest that cadmium concentration has no trigger effect on inflammation and oxidative stress in both dilaysis population.