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신장이식, 혈액투석, 복막투석 및 고혈압 환자의 심박수 변이도 비교

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Comparison of Heart Rate Variability between Patients on Kidney Transplantation, Hemodialysis, Peritoneal Dialysis due to End Stage Renal Disease and Hypertensives

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Background: Heart rate variability (HRV) can be used to assess the effects of drug and other interventions including respiration, exercise, metabolic change and psychological or physical stress on cardiac autonomic tone. HRV is regulated by the balance of sympathetic and parasympathetic tones. Few studies about HRV in patients with end stage renal disease (ESRD) were performed in Korea. So, authors investigate the autonomic nerve system activity by HRV in patients with kidney transplantation, hemodialysis, peritoneal dialysis.

Methods: We compared the pattern of cardiac sympathetic and parasympathetic activity through the time- and frequency-domain analysis of HRV with 24-hour Holter monitoring between 30 kidney transplanted subjects, 22 patients with hemodialysis, 20 patients with peritoneal dialysis and 34 control patients with hypertension. The subjects have been received hemodialysis, peritoneal dialysis and kidney transplantation at the Bongseng hospital between January 2006 and December 2010.

Results: All time- and frequency-domain HRV measures of kidney transplanted gorup were similar to those of control group. In peritoneal dialysis group, standard deviation of all normal sinus R-R intervals over 24hours (SDNN) was increased and HRV index was decreased compared with other groups. In hemodialysis and peritoneal dialysis groups, normalized unit of low-frequency (LFnorm) and ratio of low-frequency power to high-frequency power (LF/HF) were increased and normalized unit of high-frequency (HFnorm) was decreased compared with other groups.

Conclusion: Autonomic tones in ESRD patients on hemodalysis and peritoneal dialysis are decreased compared with those in patients with kidney transplantation and hypertension. And parasympathetic tones in ESRD patients on hemodilaysis and peritoneal dialysis have the preponderance over sympathetic tones. Kidney transplantation may be a modality to improve HRV index in patients with ESRD.

Key Words: 심바수변이도, 심전도, 말기신부전
Heart rate variability, Ambulatory Electrocardiography, ESRD

Table 1. Clinical Characteristics of the Subjects and Controls

	KTP patients	HD patients	PD patients	Controls
Case number	30	22	20	34
Sex				
Male, n (%)	12	13	12	18
Female, n (%)	18	9	8	16
Age, years	52.83±11.30	52.09±11.37	53.75±13.07	58.12±14.29
Hb, g/dL	13.09±1.39	10.50±0.80	10.47±0.77	13.13±1.87
Cr, mg/dL	1.02±0.18	8.70±3.10	7.95±2.24	1.03±0.29
Total cholesterol, mg/dL	180.73±35.59	160.04±52.06	157.50±49.12	190.38±48.14
Medication				
ACEi and ARB, n (%)	22 (73.33%)	17 (77.27%)	15 (75.00%)	30 (88.24%)
Beta-blockers, n (%)	13 (43.33%)	13 (59.09%)	14 (70.00%)	10 (29.41%)
CCB, n (%)	20 (66.67%)	17 (77.27%)	9 (45.00%)	24 (70.59%)

Data represent mean±SD or n (%).
Abbreviations: KTP, Kidney transplantation; HD, Hemodialysis; PD, Peritoneal dialysis; ACEi inhinitor, Angiotensin-converting enzyme inhibitors; ARB, Angiotensin receptor antagonist; CCB, Calcium channel blockers.

Table 2. The Comparison of Time-Domain and Frequency-Domain HRV Measures between Groups

	HD patients	PD patients	KTP patients	Control	p value
SDNN (msec)	92.62±47.48	729.74±211.95	120.50±41.64	123.34±43.24	0.000
HRV index	11.04±5.58	9.21±4.57	16.20±4.57	17.29±6.22	0.002
LF/HF	1.01±1.02	0.85±0.93	2.73±2.48	2.16±2.21	0.001
LF norm, nu	30.38±19.99	25.94±19.85	54.32±19.93	47.46±21.21	0.000
HF norm, nu	41.71±15.71	40.83±11.66	30.26±15.54	33.46±13.82	0.012

Abbreviations: SDNN, standard deviation of all normal sinus R-R intervals over 24 hours; HRV index, Integral of the density distribution divided by the maximum of the density distribution; VLF, very low frequency; LF/HF, ratio of power in LF/HF; LF norm, LF in normalized units; HF norm, HF in normalized units.