

Peptide (NT-proBNP) in Children with Chronic Kidney

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INTRODUCTION

Cardiovascular disease (CVD) is a frequent complication of chronic kidney disease (CKD) and a leading cause of increased mortality in young adults with CKD. One of biochemical markers of myocardial damage and stress is NT-proBNP. Its correlation with cardiac strain was proved in both adults and children with CKD.

The aim of this study was to determine relations between serum levels of NT-proBNP, calcium-phosphorus metabolism parameters and echocardiographic results in children with CKD.

METHODS

22 children (10 boys), aged 10.9 ± 5.6 years, with CKD stage 2 – 5, were included in the study. All children attended the CKD management clinic at the Department of Pediatrics and Nephrology of Medical University of Warsaw from 2013 to 2014. Children with congenital or acquired cardiac defects were excluded from the study.

In all children serum concentrations of creatinine, alkaline phosphatase (ALP), 25-hydroxyvitamin D₃ (25(OH)D), calcium (Ca), phosphorus (P), parathormone (PTH) and NT-proBNP were measured at one time. NT-proBNP concentration was determined with use of Enzyme-Linked Fluorescent Assay (ELFA) technique. Normal value for NT-proBNP was < 125.0 pg/ml. In 18 children transthoracic echocardiography was performed concomitantly. Renal function was determined by eGFR using the new revised Schwartz formula.

The study protocol was approved by the Medical University of Warsaw Ethics Committee.

	CKD 2 (n = 6)	CKD 3-4 (n = 10)	CKD 5 (n = 6)	p value	Overall (n = 22)
NT-proBNP median (lower, upper quartile)	68 (32, 118)	106 (52, 158)	665.5 (317, 1579)	0.01^{*a}	94 (52, 317)
PTH median (lower, upper quartile)	49.25 (15.2, 56.9)	38 (29.6, 62.2)	199.5 (89, 656)	0.01^{*a}	54.45 (35.9, 67.3)
25(OH)D median (lower, upper quartile)	22.05 (21.2, 29.6)	25.4 (16.4, 31.6)	32.85 (22.9, 37.8)	NS	25.4 (21.2, 31.6)
ALP median (lower, upper quartile)	194.5 (172, 204)	160 (96, 230)	269.5 (145, 407)	NS	202 (134, 230)
P mean \pm SD	2.8 ± 0.53	2.84 ± 0.43	3.32 ± 0.39	NS	2.96 ± 0.48

* significant at $p < 0.05$ (Spearman test)

^a between CKD 5 and either CKD 2 or CKD 3-4

RESULTS

Laboratory results are presented in the table. In group CKD 5 NT-proBNP and PTH levels were significantly increased. Concurrently, the highest levels of left ventricular mass index (LVMI) on echocardiographic examination were observed in this group.

NT-proBNP was found to correlate negatively with glomerular filtration rate (GFR) ($R = -0.61$, $p = 0.002$) and positively with PTH ($R = 0.49$, $p = 0.02$) and P ($R = 0.5$, $p = 0.02$).

CONCLUSIONS

- 1) In children with advanced CKD, calcium-phosphate metabolism disturbances may influence development of cardiovascular disease.
- 2) Relationships between cardiac strain markers and other parameters of calcium-phosphate metabolism in children with CKD necessitate further investigation

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