

Elevation of troponin T and N-terminal pro-B-type natriuretic peptide (nt- pro BNP) in heart failure patients with CKD

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Abstract

Elevation of Troponin T and N-Terminal pro-B-type natriuretic peptide (NT-proBNP) are commonly and strongly predictable biomarkers of Heart Failure (HF) patients with CKD. The present study included 150 people with CKD. We examined the association of baseline levels of elevation of TnT and NT-pro BNP with Heart Failure (HF) and CKD patients, after the adjustment for demographic factors, traditional cardiovascular risk factors and biomarkers of Chronic Kidney Disease. Constant medication application and mineral metabolism biomarkers cause Heart Failure and CKD. At base line, elevation of TnT levels ranged from <_5.0 to 1000 pg/ml and NT-proBNP levels ranged from <_5.0 to 35000 pg/ml. Compared to normal controls for TnT <_5.8 – 25.8 pg/ml and NT_proBNP 54 – 340 pg/ml. With this conclusion the elevation of TnT and NT-prBNP were strongly associated with incident of Heart Failure (HF) among with severe CKD. Elevations in these biomarkers may indicate subclinical changes in volume and myocardial stress that subsequently contribute to clinical Heart Failure (HF) with CKD.

Keywords: Cardiovascular disease, Heart failure, Kidney disease, Troponin T and N-Terminal pro-B-type natriuretic peptide (NT-proBNP).

Introduction

Raised Troponin T and N – Terminal Pro - B – type Natriuretic Peptide (NT – pro BNP) are more significant in cardiac problems and in chronic renal failure. However in heart attack, they rise and fall but in renal failure the rise is constant. Troponin T regulate heart muscles and tissue contraction. NT – pro BNP is vasopeptide hormones that have major role in regulating blood pressure (BP) and volume through direct effects on the kidney and systemic vasculature and represent a favorable aspects of neurohumoral activation. Troponin is a group of three proteins Troponin C, T, and I Troponin I T are the cardiac markers, they regulate heart muscle and tissue contraction. These proteins are released after the damage of heart muscles. The greater the damage to the heart, the higher the Troponin levels in the blood. Troponin levels may be rise approximately 4 to 6 hours after heart damage. Troponin in blood remain raised upto two weeks. Three different natriuretic peptides have been characterized namely A type (atrial) natriurectic peptide, B type (brain) natriurectic peptide (BN) and C type natriurectic peptide. BNP is synthesized as amino acid precursor protein and undergoes intracellular modification to a pro hormone (Pro BNP) which comprises 108 amino acids and is secreted from left ventricle (LV) in response to increased myocardial wall stress. It is also found in the kidney glomerular filtration. It has major role in the elimination of BNP. In contrast NT – pro - - BNP is thought to be principally cleared by renal excretion.

Heart Failure (HF) is the most common cardiovascular complication among patients with Chronic Kidney Disease (CKD) and it imposes significant morbidity and mortality. Among people with CKD subclinical cardiac dysfunction e.g early changes in left ventricular structure and function) The cardiac biomarkers high sensitivity Troponin T (hs

TnT) and N – terminal pro – B - type natriuretic peptide (NT – pro BNP) have been shown to predict heart failure in the general population. The use of hs TnT and NT – pro BNP to aid in the diagnosis of heart failure among patients with CKD. It has been limited because of concerns that elevated levels may be caused by reduced renal excretion. The elevation in TnT and NT – pro BNP would be independently associated with incident Heart Failure (HF) among patients with mild to severe Chronic Kidney Disease (CKD)

Material and Methods

The present study included 150 patients with end-stage renal failue undergoing chronic hemodialysis, all patients were examined by electrocardiography and two – dimensional echocardiography, at the Departments of Cardiology, Nephrology, Biochemistry and Physiology, Shadan Institue of Medical Sciences, Teaching Hospital & Research Centre, R.R District, Telangana State, India. Based on the examination results patients were found for concentric left ventricular hypertrophy, Acute Myocardial Infarction (AMI) and signs of Coronary Artery Disease (CAD) Heart Failure (HF). Blood was collected from patients before dialysis. Renal Function Test (RFT) was measured in Cobas clinical Analyser and serum electrolytes were measured in ST – 200 PLUS Electrolytes Analyzer Sensa Core. The serum TnT was measured on an ES 700 analyser (Roche Diagnostics) and NT – ProBNP was measured on Mini Vidas (Roche Diagnostics) We have examined the association of baseline levels of elevation of TnT and NT – pro BNP with Heart Failure (HF) and Chronic Kidney Disease (CKD) patients, after adjustment for their demographic facroes, traditional cardiovascular risk factors clinical and biomarkers of Heart Failure (HF) and Chronic Kidney Disease (CKD). The patients for constant medication application and mineral

Table 1: Demographic, Clinical and Physiobiochemical characteristics of Heart Failure (HF) and Chronic Kidney Disease (CKD) patients

Characteristics	Patients	Controls	P Value
Age (Years)	40 – 60	30 – 50	< 0.001
Sex (Male%)	50 – 60	40 – 60	
(Female%)	30 – 40	30 – 50	
Body Mass Index kg/m ²	35 – 40	30 – 35	
Blood Pressure mm/Hg			
Systolic	120 – 180	110 – 120	
Diastolic	100 – 120	70 – 80	
Renal Function Test (RFT)			
Blood Urea (mg/dl)	80 – 185	15 – 40	< 0.001
Serum Creatinine (mg/dl)	4.5 – 12.5	0.8 – 1.5	
Serum Uric Acid (mg/dl)	8.5 – 10.5	3.5 – 7.0	
Serum Potassium (mEq/L)	5.0 – 8.0	3.5 – 5.0	
GRF (Ru/ml)	150 – 300	110 – 200	
24 Hours Urinary Proteins (g/day)	1.0 – 2.5	0.08 – 0.9	
hs TnT pg/ml	> 10000	5 – 25	
NT – pro BNP pg/ml	> 35000	55 – 340	< 0.001

P values <0.001 are subject to all the parameters

metabolism biomarkers cause Heart Failure (HF) and Chronic Kidney Disease (CKD). At the base line elevation of TnT levels ranged from < 5.0 to 1000 pg/ml and NT – pro BNP levels ranged from < 5.0 to 35000 pg/ml. This is compared to normal controls for TnT < 5.0 to 25.8 pg/ml and NT – proBNP 54.5 to 340 pg/ml. With this conclusion elevation of TnT and NT- ProBNP were strongly associated with incident of Heart Failure (HF) among with the severe Chronic Kidney Disease (CKD). Elevation in these biomarkers may indicate subclinical changes in volume and myocardial stress that subsequent contributed to clinical Heart Failure (HF) and with Chronic Kidney Disease (CKD).

Results

Among participants in our study for Heart Failure (HF) with Chronic Kidney Disease (CKD) The elevated average mean SD + values were found as mean age was 58.5, for both male and female, mean body mass index mean 32.5 kg/m², mean blood pressure systolic 150mm/Hg, diastolic 110 mm/Hg, renal function test mean blood urea 132.5 mg/dl, mean serum creatinine 8.50 mg/dl, mean serum uric acid 9.5 mg/dl. Mean serum potassium level was 6.5 mEq/L, Mean Glomerular Filtration Rate (GRF) was 225 Ru/ml and Mean 24 hours urinary protein was 1.75 g/day. Beside the above elevated values in Heart Failure (HF) and Chronic Kidney Disease (CKD) patients more significant for hTNT > 10000 pg/ml and NT- pro – BNP > 35000 pg/ml were found.

Conclusion

In conclusion among patients with Chronic Kidney Disease (CKD), elevated levels of hs TNT and NT- proBNP were strongly associated with incident with Heart Failure (HF), even after adjustment for a broad range of demographic, traditional, clinical and physiobiochemical may indicate

early changes in volume and myocardial stress that subsequently contribute to clinical Heart Failure (HF).

Conflict of Interest: None.

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