

Correlation Between NT-proBNP and Staging of Diabetic Kidney Disease: A Cross-Sectional Study

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Abstract

Background: Diabetic kidney disease (DKD) is a prevalent and serious complication of diabetes mellitus, contributing significantly to end-stage renal disease (ESRD) and cardiovascular morbidity and mortality. N-terminal pro-B-type natriuretic peptide (NT-proBNP), a biomarker of cardiac stress, has been increasingly recognized for its role in chronic kidney disease (CKD). However, its correlation with the staging of DKD remains underexplored. This study aimed to investigate the relationship between NT-proBNP levels and the staging of DKD in patients with type 2 diabetes mellitus. **Subjects and Methods:** A cross-sectional study was conducted on 200 patients with type 2 diabetes mellitus and DKD. Patients were stratified into five stages based on the Kidney Disease: Improving Global Outcomes (KDIGO) classification. NT-proBNP levels were measured using an electrochemiluminescence immunoassay. The correlation between NT-proBNP and DKD stages was assessed using Spearman's rank correlation coefficient. Multivariate logistic regression analysis was performed to adjust for confounders such as age, gender, body mass index (BMI), and hemoglobin A1c (HbA1c). **Results:** The mean age of participants was 58.4 ± 9.8 years, with 60% being male. NT-proBNP levels increased significantly with advancing DKD stages ($p < 0.001$). A strong positive correlation was observed between NT-proBNP levels and DKD stages ($r = 0.72$, $p < 0.001$). Multivariate analysis confirmed that NT-proBNP was independently associated with DKD staging (OR = 1.45, 95% CI: 1.32–1.59, $p < 0.001$). **Conclusion:** This study demonstrates a significant correlation between NT-proBNP levels and the staging of DKD, suggesting that NT-proBNP may serve as a useful biomarker for assessing disease severity in DKD. These findings highlight the potential role of NT-proBNP in the early identification and management of DKD patients at higher risk of cardiovascular complications.

Keywords: DKD, NT-proBNP, KDIGO, ESRD.

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Introduction

Diabetic kidney disease (DKD) is a major microvascular complication of diabetes mellitus and a leading cause of end-stage renal disease (ESRD) worldwide.^[1] DKD is characterized by progressive albuminuria, declining glomerular filtration rate (GFR), and an increased risk of cardiovascular disease (CVD), which is the primary cause of mortality in this population.^[2] Early identification and staging of DKD are critical for implementing timely interventions to slow disease progression and reduce cardiovascular risk.

N-terminal pro-B-type natriuretic peptide (NT-proBNP) is a biomarker of cardiac stress and is elevated in patients with chronic kidney disease (CKD) due to volume overload, left ventricular dysfunction, and endothelial dysfunction.^[3] Recent studies have suggested that NT-proBNP levels may also reflect the severity of kidney disease and predict adverse outcomes in DKD patients.^[4] However, the relationship between NT-proBNP and the staging of DKD remains underexplored.

This study aimed to investigate the correlation between NT-proBNP levels and the staging of DKD in patients with type 2 diabetes mellitus. Understanding this relationship may provide insights into the utility of NT-proBNP as a biomarker for assessing disease severity and cardiovascular risk in DKD.

Subjects and Methods

Study Design and Participants: A cross-sectional study was conducted on 200 patients with type 2 diabetes mellitus and DKD from the outpatient department of Siddhartha institute of medical sciences and Research centre. DKD was diagnosed based on the presence of persistent albuminuria (urine albumin-to-creatinine ratio [UACR] ≥ 30 mg/g) and/or reduced estimated glomerular filtration rate (eGFR < 60 mL/min/1.73 m²) for more than three months.^[5] Patients were stratified into five stages based on the KDIGO classification.^[6]

Data Collection: Demographic and clinical data, including age, gender, BMI, and HbA1c, were recorded. Blood

samples were collected to measure NT-proBNP levels using an electrochemiluminescence immunoassay. eGFR was calculated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation.^[2]

Statistical Analysis: Data were analyzed using SPSS. Descriptive statistics were used to summarize demographic and clinical characteristics. Spearman's rank correlation coefficient was used to assess the relationship between NT-proBNP levels and DKD stages. Multivariate logistic regression analysis was performed to adjust for potential

confounders. A p-value < 0.05 was considered statistically significant.

Results

The study included 200 patients with type 2 diabetes mellitus and DKD, of whom 60% were male. The mean age of participants was 58.4 ± 9.8 years, and the mean HbA1c level was 8.2 ± 1.5%. NT-proBNP levels increased significantly with advancing DKD stages (p < 0.001).

Table 1: Demographic and Clinical Characteristics of Study Participants

Variable	Mean ± SD or n (%)
Age (years)	58.4 ± 9.8
Gender (male)	120 (60%)
BMI (kg/m ²)	28.6 ± 4.2
HbA1c (%)	8.2 ± 1.5
eGFR (mL/min/1.73 m ²)	45.3 ± 18.7
UACR (mg/g)	320.5 ± 250.4
NT-proBNP (pg/mL)	1250.6 ± 980.4

Table 2: NT-proBNP Levels by DKD Stages

DKD Stage	eGFR Range (mL/min/1.73 m ²)	Mean NT-proBNP (pg/mL)
Stage 1	≥ 90	450.3 ± 120.5
Stage 2	60–89	680.4 ± 210.6
Stage 3	30–59	1250.8 ± 450.7
Stage 4	15–29	2100.5 ± 680.3
Stage 5	< 15	3500.6 ± 950.8

Table 3: Correlation Between NT-proBNP and DKD Stages

Variable	Spearman's r	p-value
NT-proBNP	0.72	<0.001

Table 4: Multivariate Logistic Regression Analysis for DKD Staging

Variable	Odds Ratio (OR)	95% CI	p-value
NT-proBNP	1.45	1.32–1.59	<0.001
Age	1.12	1.05–1.20	0.002
Gender	1.08	0.98–1.18	0.132
BMI	1.05	0.99–1.11	0.089
HbA1c	1.10	1.02–1.18	0.015

Discussion

This study found a strong positive correlation between NT-proBNP levels and the staging of DKD, suggesting that NT-proBNP may serve as a useful biomarker for assessing disease severity in DKD. The findings are consistent with previous studies demonstrating that NT-proBNP levels are elevated in patients with CKD and correlate with the degree of renal dysfunction.^[8,9]

The independent association between NT-proBNP and DKD staging after adjusting for confounders highlights the potential role of NT-proBNP in the early identification and management of DKD patients at higher risk of cardiovascular complications. These findings have important clinical implications, as NT-proBNP may help stratify DKD patients based on disease severity and guide targeted interventions to reduce cardiovascular risk.

Conclusion

This study demonstrates a significant correlation between NT-proBNP levels and the staging of DKD, suggesting that NT-proBNP may serve as a useful biomarker for assessing disease severity in DKD. These findings highlight the potential role of NT-proBNP in the early identification and management of DKD patients at higher risk of cardiovascular complications. Further longitudinal studies are needed to explore the causal relationship between NT-proBNP and DKD progression.

References

- Alicic RZ, Rooney MT, Tuttle KR. Diabetic kidney disease: challenges, progress, and possibilities. Clin J Am Soc Nephrol. 2017;12(12):2032–2045.
- Afkarian M, Sachs MC, Kestenbaum B, et al. Kidney disease and increased mortality risk in type 2 diabetes. J Am Soc Nephrol. 2013;24(2):302–308.
- van Kimmenade RR, Januzzi JL Jr. Emerging biomarkers in heart failure. Clin Chem. 2012;58(1):127–138.
- Mishra RK, Li Y, DeFilippi C, et al. Association of NT-

proBNP with cardiovascular events and mortality in patients with chronic kidney disease: the CRIC study. *Am J Kidney Dis.* 2015;65(2):257–265.

5. American Diabetes Association. Microvascular complications and foot care: standards of medical care in diabetes—2021. *Diabetes Care.* 2021;44(Supplement 1):S151–S167.
6. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl.* 2013;3(1):1–150.
7. Levey AS, Stevens LA, Schmid CH, et al. A new equation to estimate glomerular filtration rate. *Ann Intern Med.* 2009;150(9):604–612.
8. Spanaus KS, Kronenberg F, Ritz E, et al. B-type natriuretic peptide concentrations predict the progression of nondiabetic chronic kidney disease: the Mild-to-Moderate Kidney Disease Study. *Clin Chem.* 2007;53(7):1264–1272.
9. Mishra RK, Li Y, Ricardo AC, et al. Association of N-terminal pro-B-type natriuretic peptide with left ventricular

structure and function in chronic kidney disease (from the Chronic Renal Insufficiency Cohort [CRIC]). *Am J Cardiol.* 2013;111(3):432–438.

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