Electrocardiographic Findings Among Patients with Chronic Kidney Disease

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**Introduction**: Chronic kidney disease (CKD) has an increased risk of cardiovascular disease (CVD) even before reaching End Stage Renal Disease (ESRD). The mortality rate due to cardiovascular complications is the highest in CKD patient, especially in dialysis patients. Prognosis of these patients is very poor in most developing countries because of late presentation and inadequate diagnostic facilities. Electrocardiographic (ECG) is a simple diagnostic tool to diagnose the unpredictable progressive nature of CVD disease and increased risk of sudden death due to cardiovascular events in CKD patient. This study aimed to determine the prevalence and pattern of ECG abnormalities in CKD patients.

**Methods**: This was a descriptive–cross sectional study carried out at Dr. Soetomo General Hospital, Surabaya, Indonesia. Patients diagnosed with CKD who were admitted at internal medicine ward from February to May, 2019 were included. All patients had standard 12-lead electrocardiogram examination and various findings were critically studied and interpreted independently by two consultant physicians. Collected data analyzed by frequency and percentage.

**Result**: Total 198 patients were enrolled in this study. Mean age of all patients was 52.2±11.8 years and 51% were males. 111 (56.1%) patients had hypertension, 75 (37.9%) had diabetes mellitus, and 49 (24.7%) had known CVD. Mean serum creatinine was 10.5±8.0 mg/dl, mean eGFR was 10.6±14.4 ml/min/1.73 m2. Overall, 176 (88.9%) patients had at least one form of ECG abnormality, with hypertension and anemia being the main contributory factors. These include long QTc (75 patients, 37.9%), fragmented QRS (59, 29.8%), poor R wave progression (48, 24.2%), left atrial enlargement (LAE) (46, 23.2%), peaked T wave (43, 21.7%), left ventricular hypertrophy (LVH) (31, 15.6%), pathologic Q wave (27, 13.6%), non-specific ST-T changes (26, 13.1%), frontal axis deviation (21, 10.6%), inverted T wave (14, 7.1%), 1st degree AV block (14, 7.1%), ST segment depression (13, 6.6%), right bundle branch block (11, 5.6%), wide QRS complex (7, 3.5%), premature ventricular contraction (6, 3.0%), right ventricular hypertrophy (5, 2.5%), non-sinus rhythm (4, 2.0%), and low voltage (3, 1.52%). ST segment elevation and right atrial enlargement were 2 patients (1.0%) each. Premature atrial contraction, short QTc, left bundle branch block, and 2nd degree AV block were 1 patient (0.5%) each.

**Conclusion**: ECG abnormalities are common in our hospitalized CKD patients, where long QTc and fragmented QRS were the most prevalent ECG abnormalities in our CKD patients. All hospitalized CKD patients should undergo ECG to screen for CVD.