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The Importance of the Fluctuation in Blood Sugar and Blood Pressure of Insulin-Dependent Diabetic Patients with Chronic Kidney Disease

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Abstract : Objectives: Among type 2 diabetics, patients with CKD(chronic kidney disease), insulin resistance, impaired glyconeogenesis in kidney and reduced degradation of insulin are recognized, and we observed different fluctuational patterns of blood sugar between CKD patients and non-CKD patients. On the other hand, non-dipper type blood pressure change is the risk of organ damage and mortality. We performed cross-sectional study to elucidate the characteristic of the fluctuation of blood glucose and blood pressure at insulin-treated diabetic patients with chronic kidney disease. Methods: From March 2011 to April 2013, at the Ichikawa General Hospital of Tokyo Dental College, we recruited 20 outpatients. All participants are insulin-treated type 2 diabetes with CKD. We collected serum samples, urine samples for several hormone measurements, and performed CGMS(Continuous glucose measurement system), ABPM (ambulatory blood pressure monitoring), brain computed tomography, carotid artery thickness, ankle brachial index, PWV, CVR-R, and analyzed these data statistically. Results: Among all 20 participants, hypoglycemia was decided blood glucose 70mg/dl by CGMS of 9 participants (45.0%). The event of hypoglycemia was recognized lower eGFR (29.8±6.2ml/min□41.3±8.5ml/min, P<0.05), lower HbA1c (6.44±0.57%□7.53±0.49%), higher PWV (1858±97.3cm/s□1665±109.2cm/s), higher serum glucagon (194.2±34.8pg/ml□117.0±37.1pg/ml), higher free cortisol of urine (53.8±12.8μg/day□34.8±7.1μg/day), and higher metanephrin of urine (0.162±0.031mg/day□0.076±0.029mg/day). Non-dipper type blood pressure change in ABPM was detected 8 among 9 participants with hypoglycemia (88.9%), 4 among 11 participants (36.4%) without hypoglycemia. Multiplex logistic-regression analysis revealed that the event of hypoglycemia is the independent factor of non-dipper type blood pressure change. Conclusions: Among insulin-treated type 2 diabetic patients with CKD, the events of hypoglycemia were frequently detected, and can associate with the organ derangements through the medium of non-dipper type blood pressure change.

Keywords : chronic kidney disease, hypoglycemia, non-dipper type blood pressure change, diabetic patients
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