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**Secondary hyperparathyroidism is associated with erythropoietin deficiency and endogenous erythropoietin resistance in patients with chronic kidney disease**

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**Objectives:** Erythropoietin (EPO) deficiency and resistance to endogenous EPO is an important pathophysiological feature in anemia of chronic kidney disease (CKD). Secondary hyperparathyroidism is known to contribute to anemia of CKD. We aimed to investigate the associations between parathyroid hormone (PTH) and anemia, EPO deficiency, and endogenous EPO resistance in patients with CKD.

**Methods:** This study included 409 patients with CKD [glomerular filtration rate (GFR) < 60 ml/min/1.73m<sup>2</sup>] who were not on dialysis therapy. Patients on exogenous EPO therapy and patients with iron deficiencies were excluded. Endogenous EPO resistance was assessed by calculating the ratio of endogenous EPO to hemoglobin (Hb) (endogenous EPO/Hb ratio). The associations of Hb level, endogenous EPO level, and the endogenous EPO/Hb ratio with clinical and laboratory variables were investigated by univariate and multivariate analyses.

**Results:** : In univariate analysis, intact PTH level was correlated negatively with the Hb level ( $r = -0.403$ ,  $P < 0.001$ ) and endogenous EPO level ( $r = -0.108$ ,  $P = 0.029$ ). The intact PTH level was correlated positively with the endogenous EPO/Hb ratio ( $r = 0.139$ ,  $P = 0.005$ ). Multiple regression analysis revealed that the intact PTH level remained significantly associated with the Hb level ( $\beta = -0.136$ ,  $P = 0.006$ ), endogenous EPO level ( $\beta = -0.148$ ,  $P = 0.016$ ), and the endogenous EPO/Hb ratio ( $\beta = 0.131$ ,  $P = 0.021$ ), even after adjusting for other confounding factors, including the levels of the inflammatory marker C-reactive protein.

**Conclusions:** : Secondary hyperparathyroidism exhibited significant associations with anemia, EPO deficiency, and endogenous EPO resistance in CKD patients. These associations were independent of inflammation status.