

## The Effect of Olmesartan on Hemoglobin and Erythropoietin Levels in Hypertensive Patients with Albuminuria (ESPECIAL study)

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**Introduction:** The blockade of renin-angiotensin-aldosterone system (RAAS) has been reported to decrease erythropoietin (EPO) and hemoglobin (Hb) levels in various clinical conditions. The aim of this study is to identify the lowering effect of olmesartan on EPO and Hb levels, and the correlation between low salt diet (LSD) and Hb levels.

**Methods:** The ESPECIAL study is the randomized controlled trial to identify the proteinuria-lowering effect of LSD education method, applicable to clinical settings. After a run-in period of 8 weeks, all patients received the angiotensin-II receptor blocker (ARB) olmesartan, 40 mg daily. Patients were then divided into two groups and treated for another 8 weeks; ARB plus conventional LSD education vs. ARB plus intensive LSD education. We performed the final analyses with 235 completed patients.

**Results:** Hb and EPO levels were significantly decreased with 16 weeks of ARB treatment, respectively (13.9±1.7 g/dL vs. 13.3±1.7 g/dL; p<0.001, 17.2±12.0 U/L vs. 15.1±11.6 U/L, p=0.008). There was a significant inverse correlation between  $\Delta$ Hb levels and  $\Delta$ EPO levels (Pearson's correlation analysis, R=-0.209, p=0.001). EPO levels tended to decline as the estimated glomerular filtration rate (eGFR) decreased and serum creatinine (sCr) level increased (R=0.161, p=0.013; R=0.156, p=0.017). Hb levels significantly decreased as sCr level increased and 24-hour urinary albumin excretion reduced, and systolic and diastolic blood pressure lowered (R=0.148, p=0.023; R=0.221, p=0.001; R=0.310, p<0.001; R=0.317, p<0.001). Decreased levels of sodium consumption during 16 weeks were not associated with lowering Hb level, however, the reductions in 24-hour urinary sodium excretion and Hb levels were closely related in Pearson's correlation analysis (R=0.150, p=0.023).

**Conclusions:** The use of RAAS blockade significantly reduced Hb and EPO levels. Decreased renal function, lower blood pressure, and reduction in albuminuria were associated with decreased Hb and EPO levels. Further studies are needed to clarify the cause relationship in these results.

**Key Words:** 올메살탄, 혈색소, 적혈구생성촉진인자

Olmesartan, Hemoglobin, Erythropoietin