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Loss of Cutibacterium is responsible for CKD-associated pruritus in patients undergoing dialysis

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Objectives: The pathogenesis of CKD-associated pruritus is poorly understood, although it is a serious problem worldwide. The microbiome that makes up the skin might be responsible for pruritus. Therefore, we tried to confirm the relationship between CKD-associated pruritus and skin microbiome in this study.

Methods: A total of 91 patients in Soonchunhyang University Cheonan Hospital (15 control group, 40 End-Stage Kidney Disease (ESKD) patients undergoing hemodialysis, 36 ESKD patients undergoing peritoneal dialysis) were enrolled, and swabbed in three sites; back (sebaceous area), antecubital fossa (moist area), and shin (dry area). Also, enrolled patients have done a questionnaire, which is a combination of the three methods (WI-NRS, 5-D itch scale, UP-Dial). 16S gene-based metagenomics method was applied to skin microbiome analysis.

Results: The data showed a significant microbial change in the back between the control group and the ESKD group. Here, the average composition ratio of *Cutibacterium* genus in the back was significantly lower in the ESKD group than the control group ($p < 0.05$). As a result of further analysis of the two groups of low pruritus and high pruritus among ESKD patients, here too, *Cutibacterium* was significantly lower in the high pruritus group compared to the low pruritus group ($p < 0.05$). The data showed that the skin microbiome had affected the degree of pruritus since other clinical parameters, such as age, eGFR, hemoglobin, Ca×P, and intact parathyroid hormone didn't show significant differences.

Conclusions: In ESKD patients, back was related to the changed skin microbiome characteristics, and it was confirmed that this severity correlated with the reduction of *Cutibacterium*. This research is the first research worldwide to figure out the relationship between CKD-associated pruritus in ESKD patients and the skin microbiome.