

INTERLEUKIN-31 IS ASSOCIATED WITH UREMIC PRURITUS IN HEMODIALYSIS PATIENTS

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Introduction and Aims

Interleukin-31 is a novel cytokine associated with many itching skin diseases and has been found to induce severe pruritus and dermatitis in transgenic mice. However, the role of interleukin-31 in uremic pruritus remains unknown. This study aimed to examine the relationship between uremic pruritus and serum interleukin-31 levels in uremia patients.

Material and Methods

Patients with maintenance hemodialysis in the hemodialysis unit in a referral medical center were recruited. Serum interleukin-31 levels were determined by the enzyme-linked immunosorbent assay methodology. The intensity of uremic pruritus was measured using the visual analogue scale (VAS) scores. The various characteristics of pruritus were assessed by a detailed interview questionnaire based on the short form of the McGill Pain Questionnaire. Patient demographic and clinical characteristics, laboratory parameters, as well as dialysis adequacy (assessed by Kt/V), were recorded. Multivariate linear regression was used to assess the association between serum interleukin-31 and pruritic intensity. The generalized additive models were applied to detect the nonlinear effects and the dose-response relationship between continuous covariates and pruritus intensity.

Table 1. Multivariate linear regression analysis of the predictors for VAS scores of pruritus intensity

Covariate	Parameter estimate	Standard error	P value
Interleukin-31 (pg/mL)	0.011	0.004	0.01
Kt/V	- 1.429	0.734	0.05
C-reactive protein \geq 0.418 mg/L	0.835	0.319	0.01
Alanine transaminase (U/L)	0.045	0.016	0.01
White blood cells(K/ μ L)	- 0.154	0.082	0.06
Ca \times P* (mg/dL \times mg/dL)	0.020	0.011	0.06

** Ca \times P = Product of albumin-adjusted serum calcium (Ca) and serum phosphorus (P).

Results

A total of 178 patients completed this study. Among the study participants, 34.8% suffered from uremic pruritus. The patients with uremic pruritus had higher serum interleukin-31 levels than those without pruritus symptoms (31.7 ± 51.0 vs 11.8 ± 17.2 , $P=0.04$). Higher serum levels of interleukin-31 were positively correlated with higher VAS scores of pruritus intensity ($r=0.15$, $P=0.02$). Furthermore, the multivariate regression analysis showed that higher serum levels of interleukin-31, C-reactive protein, and alanine transaminase, as well as lower Kt/V, were independent predictors for higher pruritus intensity after adjusting for potential confounding factors (Table 1). A positive dose-response relationship between serum levels of interleukin -31 and VAS scores of pruritus intensity was also found (Figure 1).

Conclusion

Interleukin-31 may play an important role in hemodialysis patients with uremic pruritus. Whether a causal relationship exists between interleukin-31 and uremic pruritus deserves further study.

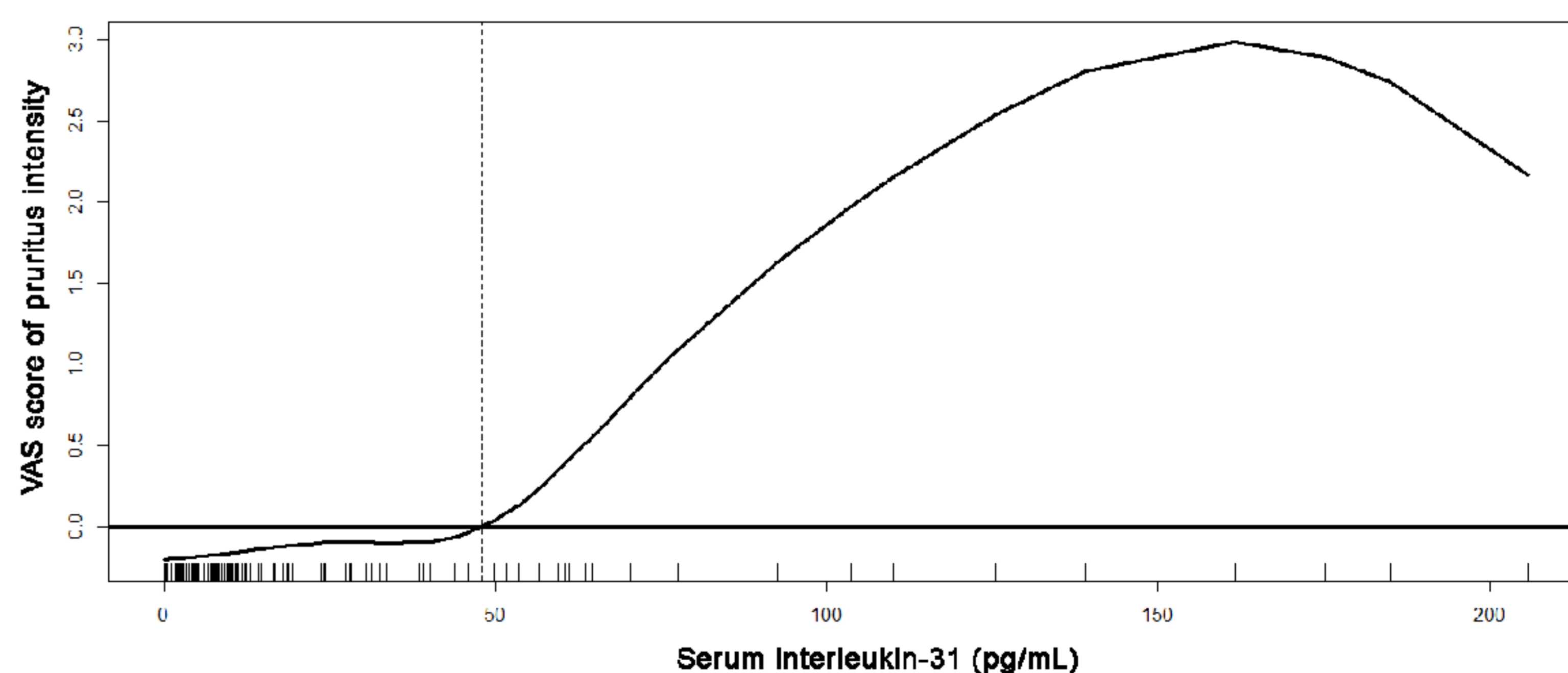


Figure 1. The generalized additive model plot of the relationship between serum interleukin-31 and visual analogue scale (VAS) score of pruritus intensity. The plot shows a positive dose-response relationship between interleukin-31 and pruritus symptoms. The model of the plot is adjusted for Kt/V, C-reactive protein, alanin transaminase, white blood cells, and the product of calcium and phosphate.