Population pharmacokinetics of Amikacin in critically ill Mexican patients with obesity

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Background: Amikacin is an aminoglycoside antibiotic that is useful in the treatment of serious infections caused by Gram-negative bacteria. The aim of this study was to analyze the pharmacokinetic behavior of amikacin and estimate the dosing requirements in intensive care unit (ICU) Mexican patients with obesity using a mixed-effect model.

Methods: The patient population comprise 50 ICU patients of Hospital Central "Dr. Ignacio Morones Prieto" in San Luis Potosí (México). A one-compartment intravenous infusion model was used, and the following covariates were tested for their influence on the clearance (CL) and volume of distribution (Vd): age, weight, sex, height, body mass index (BMI), ideal body weight (IBW), adjusted body weight (ABW), serum creatinine, creatinine clearance (CrCL), urea, blood urea nitrogen, clinical diagnosis, mechanical ventilation and concomitant pharmacotherapy. The nonlinear mixed-effect model (NONMEM) was used to assess the population pharmacokinetic model of amikacin in this patient population.

Results: The final population model accounting for amikacin pharmacokinetics in ICU patients was: CL (L/h) = 7.5 (CrCL/130) 0.86, Vd(L) = 20.2 (IBW/68) 2.9, where CrCL and IBW influenced clearance and volume of distribution amikacin, respectively. Internal and external validations were performed to probe the stability and the precision of the final model. Stochastic simulations were executed to propose dosing guidelines based on the CrCL and IBW to reach expected amikacin concentrations.

Conclusion: A population pharmacokinetic model has been developed for ICU Mexican patients with obesity. The predictive performance of this population model for amikacin serum concentrations seems suitable for clinical purposes.

Biography

Aréchiga-Alvarado is a Pharmacobiological Chemist graduated from the Autonomous University of Zacatecas, México. After college, she has worked in a clinical analysis laboratory, later she was a Laboratory Technician at a university and she was in charge of a laboratory of soil and water physicochemical analysis. She is currently graduating from the Master of Pharmacobiological Sciences at the Autonomous University of San Luis Potosí, México.

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