Genetic and nongenetic factors affecting vancomycin population pharmacokinetics and pharmacodynamics: A systematic review

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Abstract:

Despite frequent vancomycin prescribing, achieving optimal therapeutic outcomes is challenging due to its complex pharmacokinetic (PK) and pharmacodynamic (PD) properties. Those characteristics are influenced by various parameters, including both genetic and non-genetic variables, rendering accurate dosing and monitoring challenging for clinicians. This systematic review was conducted in accordance with the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, ensuring a standardized and comprehensive approach to the literature search, data extraction, and reporting. We searched the publications for all appropriate evidence on genetic and non-genetic factors affecting vancomycin population PKs and PDs from 2014 to January 2024. This review's initial electronic database search found 1,543 relevant studies. Following the removal of automation-ineligible records and in-depth title relevance screening, the titles and abstracts of 67 publications were examined. After duplicate removal, 50 articles remained, and 23 were ultimately included based on the predefined inclusion and exclusion criteria. Vancomycin exhibits substantial PK and PD variability, and standard dosing often fails to achieve therapeutic targets. Area Under the Curve -guided therapeutic drug monitoring remains the most reliable strategy, while genetic factors appear to play a limited, toxicity-focused role.

Keywords:

Covariates, genetic variation, pharmacodynamics, pharmacokinetics, renal function, vancomycin