



Therapeutic Drug Monitoring: An Important Parameter in Maintaining Drug Efficacy and Preventing Toxicity

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In clinical practice therapeutic drug monitoring is essential for measuring concentration of specific narrow therapeutic drugs at designated intervals in the blood. It is considered as a useful tool in evaluating the therapeutic efficacy and preventing the toxic effects. Anti-epileptic drugs (carbamazepine, phenytoin, Phenobarbital) and vancomycin are some of the drugs included in narrow therapeutic drug category recently increased trend of vancomycin resistance has been observed especially in under developed countries.

Vancomycin is a glycopeptides antibiotic and it produces its effect by inhibiting the cell wall synthesis. It is considered a time dependent antibiotic. Vancomycin is indicated in treatment of complicated infections such as endocarditis, osteomyelitis, meningitis and hospital acquired pneumonia caused by *Staphylococcus aureus*.

Most accurate and practical method for monitoring efficacy is by evaluating trough serum vancomycin concentration. Approximately a quarter fourth dose the trough levels of vancomycin should be obtained at steady state prior to administration of the next dose. In order to improve penetration of vancomycin, for obtaining better clinical outcomes and for achieving probability of obtaining targeted serum concentrations vancomycin's trough serum concentrations should lie between 15-20 mg/L.

TDM of vancomycin is specially required when high or aggressive dosing is being done to treat complicated infections or when the

treatment is of prolonged duration. Its evaluation is also necessary when the patient is renally compromised or when vancomycin is being administered with aminoglycoside its levels are also monitored in patients with altered pharmacokinetics and in patients with burns and edema (because of abnormal volume of distribution). Sub therapeutic serum concentration will increase chances of Vancomycin Resistant *Staphylococcus aureus* (VRSA) due to inability of the drug to penetrate and target the cell wall of bacteria and damage it leading to resistance. Similarly high therapeutic concentration will lead to toxic effects especially ototoxicity if vancomycin is given with aminoglycosides.

More focus needs to be given on TDM of vancomycin to overcome issues of resistance. TDM is also essential especially in pediatric population with respect to narrow therapeutic drugs especially antiepileptics and vancomycin to overcome toxic effects and resistance. Awareness needs to be created in parents regarding this aspect as well as all health care personnel.

Journal of Pharmacokinetics and Experimental therapeutics publishes researches based on these parameters that could lead to improved efficacy and safety of drug. Further researches should be conducted on effects of TDM on narrow therapeutic drugs; it might lead to reduction of vancomycin resistant *Staphylococcus aureus* and improve safe and efficacious use of narrow therapeutic drugs in pediatric population.

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