

Pharmacokinetics of ampicillin trihydrate following intravenous administration to water deprived Nubian goats

ABSTRACT

The present study reports the effect of water deprivation in the Nubian goat on the pharmacokinetics of ampicillin trihydrate following intravenous administration at a dose rate of 10 mg kg⁻¹. Water deprivation for two days, which resulted in about 7.5 per cent loss in bodyweight, produced no significant effects on the pharmacokinetic parameters of the drug. In dehydrated goats that had lost an average of 9.8 per cent of their initial bodyweights, within three days of water deprivation, ampicillin showed significantly slower clearance values ($P < 0.001$), without affecting significantly the pharmacokinetic parameters describing the distribution of the drug. After four days of water deprivation a dehydration level at which goats lost an average of 12.6 per cent bodyweight was reached, which resulted in significant alterations in the distribution and elimination pharmacokinetic parameters of ampicillin. The volume of the central compartment (V_c) and the volume of distribution at steady state (V_{dss}) were significantly decreased ($P < 0.01$) leading to significant elevation in plasma concentrations of the drug ($P < 0.01$) compared with the normally hydrated animals. In water deprived goats, significantly slower clearance of the drug ($P < 0.001$) and reduced elimination rate constant ($P < 0.01$) with the subsequent increases in the half-life time were also observed. Dosage intervals between the usual doses of ampicillin can be increased in dehydrated goats and concentrations which were high enough to kill susceptible microorganisms could still be achieved.

Keyword: Water deprivation; Nubian goat; Pharmacokinetics; Ampicillin trihydrate