PHARMACOKINETICS OF A SINGLE ORAL DOSE OF PHENYLBUTAZONE IN SOUTHERN WHITE RHINOCEROS (*Ceratotherium simum simum*)

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Abstract

Southern white rhinoceros (*Ceratotherium simum simum*) in captive and semi-captive settings frequently develop painful conditions, such as traumatic injuries or osteoarthritis, necessitating the administration of pain-relieving medications. A commonly chosen nonsteroidal anti-inflammatory drug (NSAID) is phenylbutazone because of availability of oral formulations and the familiarity of its use in domestic horses.[1] For this study, a single oral dose of phenylbutazone (Phenylbute Powder, 1 g/10 g powder, Phoenix™ Pharmaceutical Inc., St. Joseph, MO, USA) at 2 mg/kg was administered to healthy adult white rhinoceros (n = 38) housed at six North American zoological institutions. Each rhinoceros had blood samples collected under voluntary behavioral restraint at up to four of the predetermined time points (0, 1, 1.5, 2, 3, 4, 6, 8, 10, 24, 30, and 48 hr). Drug analysis was performed by high pressure liquid chromatography. The pharmacokinetic parameters were calculated with nonlinear mixed-effects m odeling using Phoenix® software (Phoenix®, NLME™, Certara, Princeton, NJ, USA). The preliminary analysis showed a peak concentration (C_{MAX}) of 5.64 µg/ml at 2 hr, and a terminal half-life ($T_{½}$) of 7.2 hr. The concentrations achieved were similar to what has been reported for horses. The plasma phenylbutazone concentrations were within the effective concentration for 50% response (EC_{50}) for horses, which is described as at 1.5 to 4.5 µg/ml.[2] After our successful preliminary study, additional studies are proceeding to examine a large number of treated animals. This study will represent the first pharmacokinetic data of phenylbutazone in any rhinoceros species.

Key words: Analgesia, *Ceratotherium simum simum*, pharmacokinetics, phenylbutazone, southern white rhinoceros

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