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Pharmacokinetic study of anti-histaminic activity of formulated nano-gel/emulgel and conventional intranasal drug delivery of diphenhydramine HCl by HPLC method

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Clinical studies have demonstrated the influence on pharmacokinetics by circadian pattern of certain therapeutically active drugs. The bioavailability of drugs is time-dependent, depending on dose administration. Diphenhydramine was chosen as model drug due to its lipophilicity, low molecular weight and good bioavailability. This study was aimed to investigate pharmacokinetic parameter's differences between formulated Nano-gel, Nano-emulgel and existing conventional spray (as reference) for intranasal drug delivery of Diphenhydramine in healthy as well as allergenic rabbit model by HPLC method. 10 mg of each dosage was administered intranasally to six groups (three for each study) of white male New Zealand rabbits (n=6), following cross-over design pattern and plasma concentration was determined by HPLC method. Pharmacokinetic parameters of each dosage form in all groups were calculated by using plasma concentration-time data through PK Solver Microsoft Excel 2013. To determine the statistical significant difference at model ($p<0.05$) in all groups of healthy as well allergenic rabbits, completely randomized design (CRD) and one-way ANOVA was applied. The fluctuations in plasma concentration vs. time plots, indicating the physiological environment have influence on drug absorption through target sites. The maximum plasma drug concentration (C max) and time reach to peak plasma concentration (T max) were almost same in DPH nano-gel and nano-emulgel intranasal delivery and comparatively high to conventional DPH nasal spray, indicating the promising way for sustained intranasal drug delivery.

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