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Pharmacokinetics of major bioactive compounds after oral administration of Majiepingchuan extracts and transdermal administration of Majiepingchuan cataplasm in beagles

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MajiePingchuan (MJPC) cataplasm, composed of ephedra, mustard, corydalis, bitter almond, and ginger juice, is a new type of topical preparation in traditional Chinese medicine. Our previous study showed that MJPC cataplasm extractive could inhibit the degranulation of RBL-2H3 cells activated by compound C48/80 and treat asthma by enhancing the reactivity of Th1 cells and Tregs, limiting the reactivity of Th2 and Th17 cells, and regulating the balance of Th1/Th2 cells and Th17 cells/Tregs. To explore the differences between two types of administration, the pharmacokinetics of major bioactive compounds after the oral administration of Majiepingchuan extracts and transdermal administration of Majiepingchuan cataplasm were investigated in beagles. Established HPLC–MS/MS methods were applied for the pharmacokinetic study of Majiepingchuan cataplasm. The results showed that ephedrine and pseudoephedrine were able to cross the skin into the bloodstream, while amygdalin, tetrahydropalmatine, and sinapine thiocyanate could not. In addition, double peaks were observed for the first time in serum concentration-time profiles of ephedrine and pseudoephedrine after transdermal administration of Majiepingchuan cataplasm. The mean retention time of ephedrine and pseudoephedrine after transdermal administration were prolonged compared to that of oral delivery. Bioavailability studies showed that the area under the curve (AUC_{last}) of ephedrine by Majiepingchuan cataplasm was 1.01 times higher than that by Majiepingchuan extracts, which indicated that Majiepingchuan cataplasm had higher bioavailability and long-term efficacy. In this study, we hypothesized the reasons for the failure of compounds to enter the bloodstream as well as the mechanism underlying the double-peak phenomenon of ephedrine and pseudoephedrine epimers following transdermal administration of Majiepingchuan cataplasm.

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