Nifedipine Pressure Sensitive Adhesive Patches for Treating Diabetic Wounds
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**Purpose**
The main objective of this project is to design, develop and characterize soft skin pressure sensitive adhesive patch system for controlled regional delivery of nifedipine, as a potential treatment option for foot ulcers in patients with diabetes.

**Methods**
Matrix patch system of nifedipine was formulated using Dow Corning® MG 7-9800 soft skin pressure sensitive adhesives (SS-PSA), 3M™ Scotchpak™ 9730 backing membranes and 3M™ Scotchpak™ 1020 release liner. SS-PSA patches were prepared by dissolving nifedipine in ethyl acetate. This was mixed with a mixture of soft skin adhesive part A and part B in 1:1 ratio. The resulting homogeneous mixture was casted on release liner and placed in oven at 40°C for 2h. Different drug loads were evaluated for miscibility of drug and crystallization of drug in polymer matrix by observing under light microscope. Formulated patches were evaluated for content uniformity, weight variation, moisture absorption and swellability. Formulated patches were subjected to release studies using USP type-V apparatus (Paddle over Disk). Samples from the basket were withdrawn at pre-determined time points and the amount of nifedipine released from the patch was measured by High Performance Liquid Chromatography.

**Results**
The final formulated patches consisted of 20 mg of nifedipine per patch of area ~50 cm². The patches showed good content uniformity (98.01±2.14 %), weight (16.53±1.13 g) and thickness (2.01±0.14 mm). In vitro release studies of nifedipine from the patches were performed using USP type-V apparatus. The rate of release was consistent throughout the study. The cumulative amount of drug released from the patches was fitted to Higuchi kinetic model ($R^2=0.965$). The total amount of drug released at the end of 12 h was ~9%. The patches did not increase in size after release studies, which is one of the desirable characteristic for a wound adhesive.

**Conclusion**
SS-PSA matrix type patches are capable of controlling the release of drug in the open wounds. The sustained release of drug could avoid systemic dumping of drug and lead to regional vasodilatation which is desirable for rapid wound healing, particularly in diabetic patients who have poor peripheral circulation.