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Lipidic polymer nanohyrid system for delivery of lercanidipine in the management of Hypertension.

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Objectives: In the current study, lipophilic dihydropyridine calcium antagonists Lercanidipine (LPHNs) are designed, developed and optimized to reduce hypertension.

Methods: A self-assembly process was used to construct LPHNs. The work of Taguchi indicates that polymer concentration and lipid cocentration are critical factors for the study of substance and process improvements. The central composite design was used to systematically optimize these factors for the particle volume, trap efficiency, partition coefficient and in vitro release of LPHN as the answer variables. These factors were evaluated.

Results: The optimized formulation was embarked upon by "trading-off" various independent variables and exhibited entrapment efficiency of 85.3%, P_{Coeff} of 0.16, Q_{6h} of 92.17%, $T_{60\%}$ of 3.4h and bioadhesion of 92.2%. *In vivo* pharmacokinetic studies conducted in rabbits, showed remarkable superiority of the optimized formulation ($p<0.001$) with nearly 9-fold enhanced bioavailability *vis-à-vis* pure lercanidipine. Compared to a population that was uncontrolled, medium to high doses of orally loaded lercanidipine LPHNs, demonstrated that these nanoparticles had long-lasting and significant antihypertensive effects in rats that are spontaneously hypertensive and reducing the blood pressure over 24 hours. Accelerated stability studies carried out for 6 months demonstrated nearly similar drug release profiles at different time intervals, indicating robustness of the optimized formulation.

Conclusions: In a nutshell, the present studies resulted in successful development of optimized lercanidipine LPHNs for oral route in management of hypertension.