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Development of transethosomes patch for delivery atorvastatin calcium transdermally: *In vitro* and *in vivo* studies

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ABSTRACT

Atorvastatin calcium is an antihyperlipidemic with low bioavailability, and to address this limitation, a transdermal delivery system utilizing transethosomes as a carrier was developed. This study aimed to enhance the bioavailability of atorvastatin calcium by transitioning from oral to transdermal administration. The six different formulas of transethosomes were observed based on particle size, PDI, zeta potential, deformability index, and morphology. Furthermore, the patch's characteristics, penetration, pharmacokinetic, and irritation studies of transethosomes patch were observed. The results showed that atorvastatin calcium transethosomes had a particle size of ≤ 130.59 nm with PDI and zeta potential values of ≤ 0.24 and ≥ −51.87 mV, respectively. The vesicles featured spherical morphology and an excellent deformability index. The transethosome patches obtained had a pH and viscosity value of 5.7 and ≥ 8741 mPa.s, respectively. The properties of transethosomes loaded in the patch were observed to show a particle size of ≤ 249.83 nm and zeta potential ≥ −44.73 mV. A penetration study of the atorvastatin calcium transethosomes patch reveals high flux, especially the G6 formula, increasing bioavailability by 3.67-fold and not irritating. In conclusion, developing a transethosomes patch for transdermal delivery proved to be an effective method for enhancing the bioavailability of atorvastatin calcium.