The Effect of Combined Polymer Types and Their Mechanical Properties on Alpha-Arbutin Dissolved Microneedles

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Abstract

The dissolving microneedles containing Alpha arbutin were developed to treat skin pigmentation. A combination of Alpha arbutin, Vitamin C, Hydroxypropyl methylcellulose, and Polyvinylpyrrolidone produced fully-formed microneedles. The pH of the formulation was 4.78 ± 0.57. The compression test revealed a height reduction of 8.481 ± 1.14%. A thumb pressing enabled the MN to penetrate three layers of parafilm. A new method of separation between Alpha arbutin and Vitamin C using liquid chromatography tandem mass spectrometry was developed and used for calculations of drug content and the drug release samples. The loading efficiency for Alpha arbutin was estimated to be 89.01 ± 2.03%, and for Vitamin C it was revealed to be 94.09 ± 7.67%. The permeation for Alpha arbutin and Vitamin C was 102.94 ± 7.04% per 24h and 86.59 ± 5.51% per 24h, respectively. The results confirm the successful development of a well-designed MN formulation.

Keywords: Alpha arbutin, LCMS/MS, Microneedles, Transdermal delivery, Vitamin C.