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| **Fabricating microneedles for the treatment of cutaneous leishmaniasis.** |
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| **Background:** Cutaneous leishmaniasis (CL) is a neglected tropical disease caused by *Leishmania* parasites which are transmitted to humans by sandfly bites. CL causes skin lesions and permanent disfiguring scars, which result in social isolation and poor mental health of the sufferers. According to the World Health Organization, topical treatment is preferred for CL, due to enhanced efficacy and reduced risk of side effects but intralesional injections for CL are painful and discomforting. Paromomycin (PM) is a drug which is available in a semi-solid dosage formulation (cream) for the treatment of CL. However, its efficacy is hampered by the formulation’s limited ability to deposit PM into the lower region of the skin where the parasites reside. Therefore, there is a need to develop a new, low-cost topical formulation with improved efficacy and convenience. Dissolving microneedles are minimally invasive drug delivery systems which bypass the skin barrier and deliver drugs to the lower skin regions, without causing pain. The aim of this study is to develop PM-containing dissolving microneedles for the treatment of CL. |
| **Methods:** PM-containing microneedles were prepared using silicone moulds. Mechanical testing was done to evaluate the effect of loading PM into microneedles. Skin penetration efficiency and depth were evaluated by manually inserting the PM-containing microneedles into an artificial skin model. |
| **Results:** 100 microneedles 0.5mm high were formed with well-defined shapes and sharp tips. Although the addition of PM reduced the mechanical properties of the microneedles, the microneedles did not break after an axial force was applied. 100% of the needles penetrated the first layer of the skin model, demonstrating that they are able to puncture the outermost skin’s barrier, the stratum corneum. The microneedles penetrated to a depth greater than 0.2mm from the skin surface, equating to the region of the skin where *Leishmania* parasites typically reside. |
| **Conclusions:** The results from this study suggest that PM-containing microneedles are suitable for CL treatment. However, in-vitro drug release studies and cell culture studies are required to measure their rate of drug release and anti-leishmanial activity respectively. |