

Nanomedicine as potential response in vitiligo disorder and social impairment

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Vitiligo is a long-term skin condition that leads to the loss of pigmentation in both the skin and hair, and it severely impact on patients' quality of life who suffer from it [1]. Currently available treatments, both topical and systemic, are often ineffective due to the skin barrier properties and the way drugs are metabolized or inactivated. This has led researchers to explore the use of ultradeformable nanomedicines as a potential treatment. Khellin is a natural active ingredient that has shown potential in the treatment of vitiligo, but its physico-chemical properties strongly limit its skin permeation as free form [2]. Considering the impairment of the antioxidant pathways as co-factors in vitiligo skin disorder, the goal of this study is to create nanocarriers that could deliver both khellin and idebenone through the skin. Nanocarriers were assessed for their physicochemical properties, i.e. size, distribution, zeta potential, stability, entrapment efficiency. Ethosomes made up of 1% w/v Phospholipon 90G and 30% ethanol, along with transfersomes, were identified as having the most favourable features for cutaneous application and were chosen for further in vitro testing. Skin permeation studies using human stratum corneum and epidermis showed that transfersomes provided better permeation, enhancing the delivery of both khellin and idebenone. The effectiveness of the realised nanomedicines was investigated considering an in vitro model of vitiligo, using human melanocytes pre-treated with hydrogen peroxide. Results indicated that nanocarriers containing khellin and idebenone helped in restoring pigmentation. Further in vitro testing performed on human healthy volunteers confirmed the great safety of the realised nanocarriers, suggesting their potential clinical use. Overall, our study demonstrated the adaptability of the vesicular nanosystems in delivering a combination of two active compounds, an antioxidant and furanochromone, that may offer a promising alternative treatment for vitiligo disorder.

References

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- [2] Pereira J., *Pharmaceutics*, 12:398 (2020). doi.org/10.3390/pharmaceutics12050398