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Lipid-based nanocarriers for intranasal delivery of Rifampicin

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This study aimed to prepare rifampicin-loaded cubosomes (RIF-CUBs) followed by coating with chitosan (CUB-CS) for intranasal administration to improve the stability, solubility and bioavailability of RIF.

RIF-CUBs were prepared using a melt dispersion emulsification method [1], with different types of Pluronic® (F127 and F108). Then, chitosan 1% w/v was used to prepare CUB-CS. The prepared formulations were characterized regarding to Z-average, PDI, Zeta Potential, EE%, in vitro drug release, ex vivo nasal permeability (ETT-TUKEB: IV/3880-1/2021/EKU), in addition to the chemical stability.

The results showed the suitability of RIF-CUBs and CUB-CSs as a drug carrier; where Z-average <200 nm, PDI <0.5, ZP >|±30| mV. CUB-CSs demonstrated higher EE% values comparing to RIF-CUBs. In addition, the release rate was higher at pH 5.6 than pH 7.4, and only RIF-CUB1 had higher release rate than pure RIF while the other formulations showed more controlled release at both conditions. The ex vivo results showed that RIF diffusion from the prepared formulations was higher than pure RIF. Finally, the chemical stability of RIF was improved by utilizing RIF-CUBs and CUB-CSs.

In conclusion, utilizing of cubosomes as a drug carrier of RIF for intranasal delivery system could be a promising approach to improve the stability and bioavailability of RIF.

References

1. Mokhtar, S. et al. Front. Chem. 10, 1-15 (2022).

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