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Aloe-emodin-Loaded Microemulsion-Based Herbal Gel: Design, Optimization, and Therapeutic Evaluation for Diabetic Wound Healing

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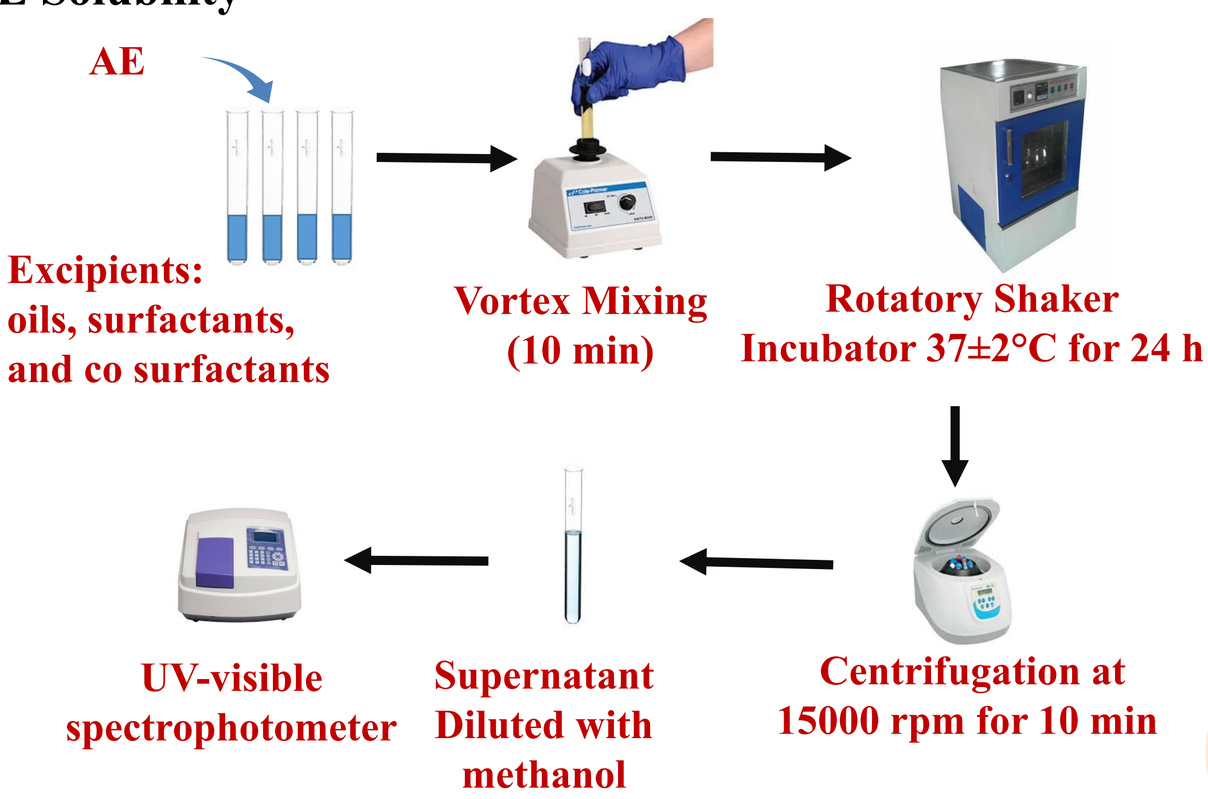
INTRODUCTION & AIM

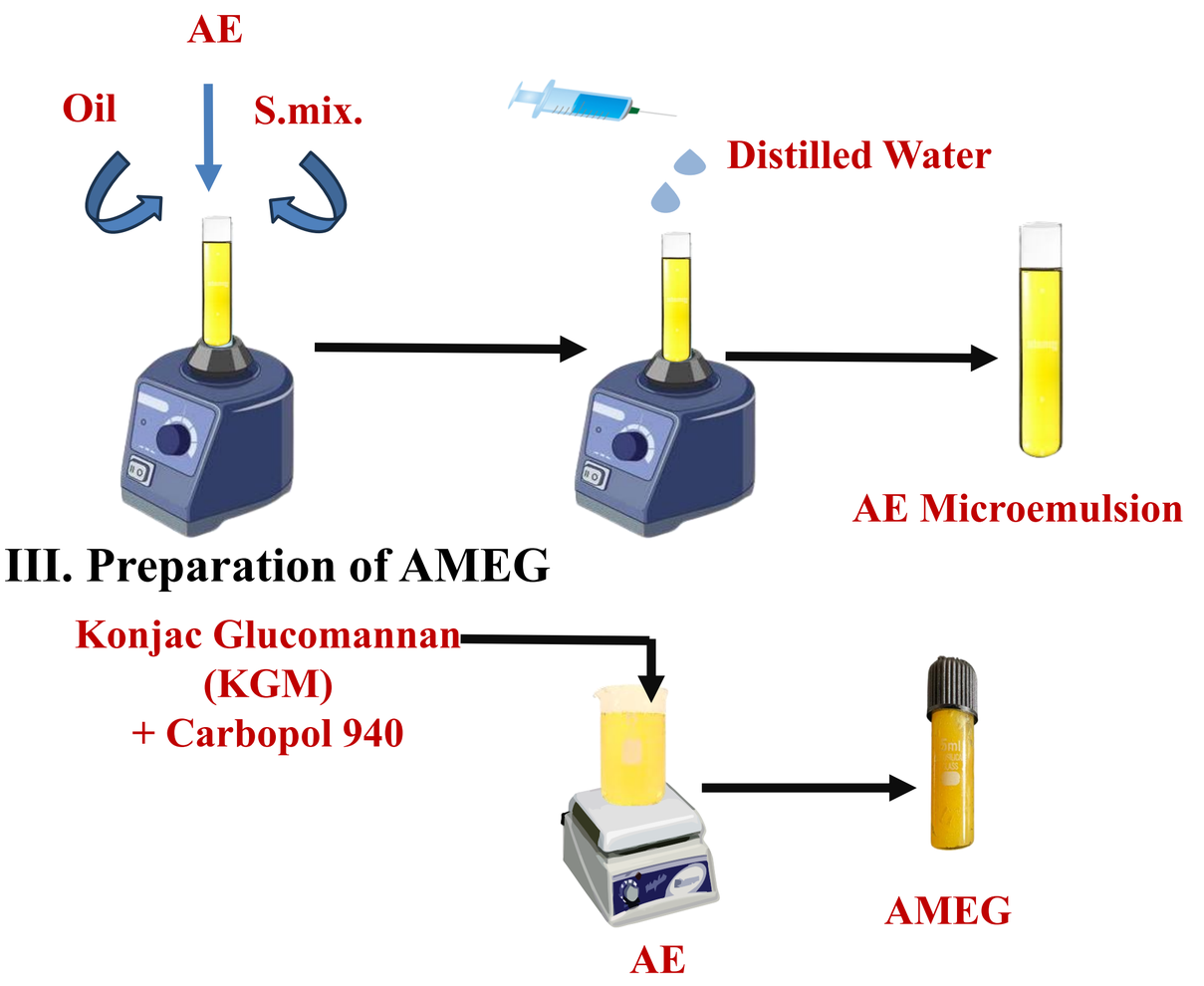
This study developed an Aloe-emodin (AE)-loaded microemulsion gel (AMEG) to improve AE's poor solubility and inadequate permeability for diabetic wound healing. Prepared with Capryol 90, Labrasol, Tween 80 and Transcutol P, using konjac glucomannan and Carbopol 940 as gelling agents, the optimized AMEG showed nanosized droplets, stability, sustained release and enhanced skin permeation. In diabetic rats, it markedly accelerated wound closure, reduced inflammation, promoted collagen deposition and achieved complete re-epithelialization, highlighting AMEG as a promising non-invasive therapy.

METHOD

I. Selection of Oil, Surfactant, and Co-surfactant Based on AE Solubility

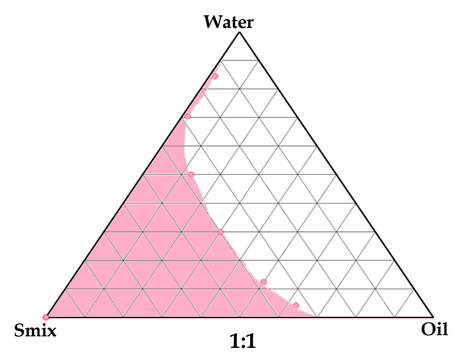


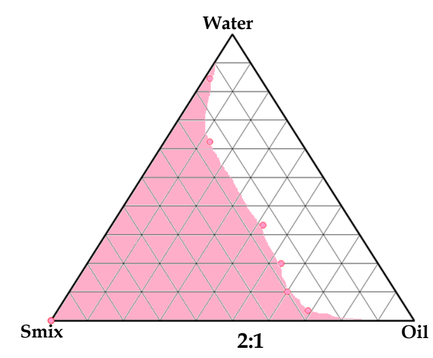
II. Formulation of AE Microemulsion

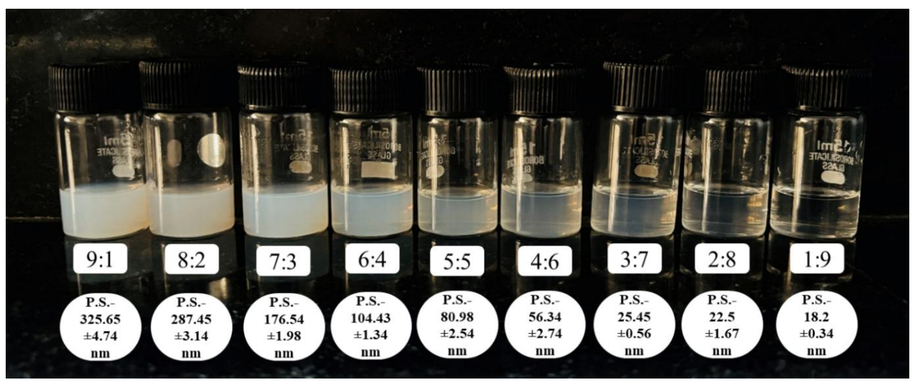


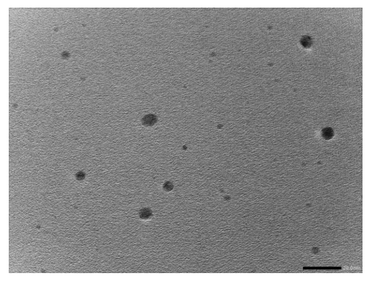
III. Preparation of AMEG

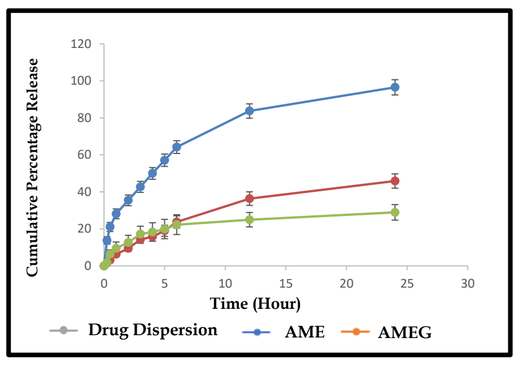
RESULTS & DISCUSSION

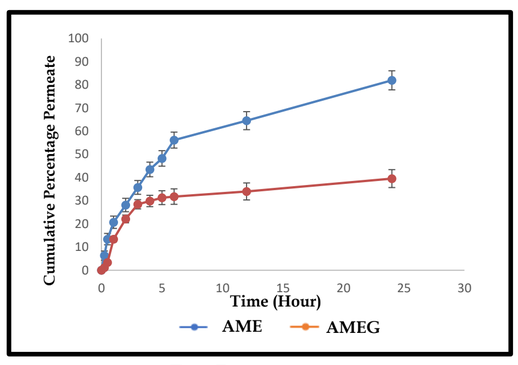


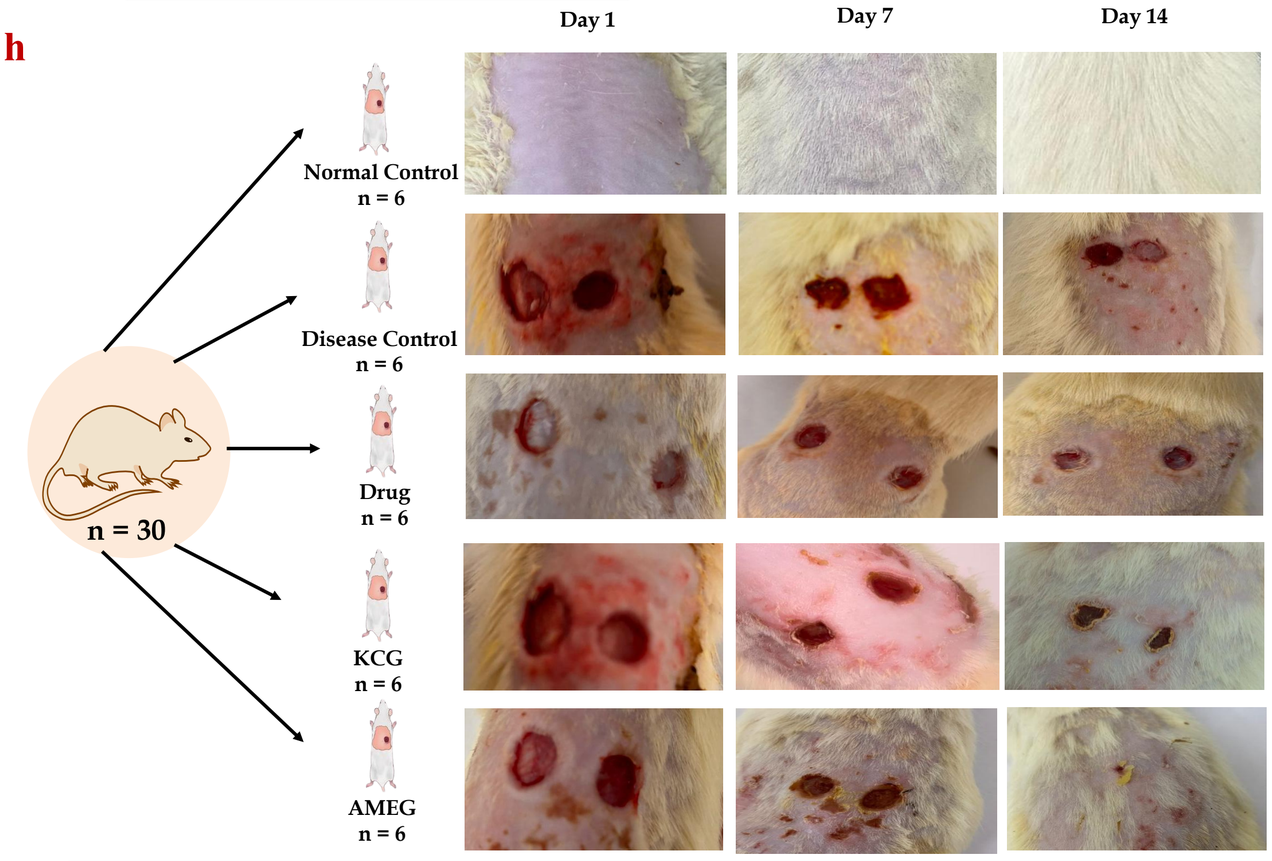












CONCLUSION

AE, a natural phytoconstituent, possesses strong anti-inflammatory, antimicrobial, and antioxidant properties, but its topical use is restricted by poor solubility and BCS Class II status. An oil/Smix-based ME was developed, forming nanosized droplets that improved skin diffusion compared to the unformulated drug. Incorporation of KGM as a gelling agent enhanced structural stability and imparted wound-healing activity. The optimized AEMEG shows potential in diabetic wound ulcer management, emphasizing MEs as effective carriers and KGM as a multifunctional excipient.

FUTURE WORK / REFERENCES

1. Daryab M, et al. (2022) Preparation and characterization of lidocaine-loaded, microemulsion-based topical gels. Iranian Journal of Pharmaceutical Research: IJPR21(1):e123787.
2. Zhou N, et al. (2022) Konjac glucomannan: A review of structure, physicochemical properties, and wound dressing applications. Journal of Applied Polymer Science139(11):51780.