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(57) Abstract :
[043] The present invention discloses the development, formulation, and physicochemical characterization of a novel quinoline–thiazole hybrid compound designed to combat multidrug-resistant bacterial and fungal pathogens. The hybrid molecule is synthesized via a one-pot condensation and cyclization reaction, integrating the pharmacophoric features of quinoline and thiazole to achieve synergistic antimicrobial activity. The compound is further formulated into nanoparticulate or liposomal drug delivery systems to enhance solubility, stability, and sustained drug release. Comprehensive characterization using FTIR, NMR, XRD, and DSC confirms structural integrity and thermal stability. The formulation exhibits broad-spectrum antimicrobial efficacy with MIC values between 0.25–2 μg/mL, coupled with high biocompatibility and prolonged physicochemical stability. The invention presents a promising next-generation antimicrobial formulation capable of addressing the global challenge of multidrug resistance in clinical therapeutics. Accompanied Drawing [FIGS. 1-2]

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