Self-emulsifying Drug Delivery Systems as a Paradigm for Enhancing Bioavailability of Phytoconstituents

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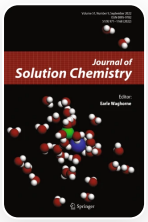

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Jyotsana Bhatt, Archana Dhyani, Gauree Kukreti, Sumit Durgapal & Ganesh Kumar

Abstract

The major limitations associated with phytoconstituents are their poor solubility and bioavailability in gastric fluid, which limit their further exploration to their full potential. To overcome these challenges, self-emulsifying formulations have emerged as a promising strategy to enhance the solubility and bioavailability of herbal molecules and phytoconstituents with poor aqueous solubility. SEDDS formulations typically comprise an isotropic mixture of oil, surfactant, and co-surfactants. The concentration of these excipients is chosen based on pre-formulation studies, such as phase equilibrium studies, the oil's solvent capacity for the drug, and the mutual miscibility of the excipients. This review primarily discusses the development of SEDDS and the role of different excipients in tailoring the oral bioavailability and aqueous solubility of lipophilic phytoconstituents. The various ratios of primary excipients used by different researchers, along with their effects on drug solubility and bioavailability, are presented in a tabular format. Relevant research databases, including PubMed, Google Scholar, Google Patents, Scopus, and Web of Science, were used to review the research data for various self-emulsifying herbal

formulations using the keywords "Self-emulsifying, SEDDS, SMEDDS, SNEDDS, Lipid formulation, LFCS". The manuscript further explores the potential applications of SMEDDS and SNEDDS in the treatment of various ailments using different herbal extracts and phytoconstituents. In conclusion, the review effectively presents the role of SEDDS in improving the oral bioavailability of lipophilic compounds.

Data Availability

No datasets were generated or analysed during the current study.

Abbreviations

SE: Self-emulsifying

SEDDS: Self-emulsifying drug delivery system

SMEDDS: Self-microemulsifying drug delivery system

SNEDDS: Self-nanoemulsifying drug delivery system

PDI: Polydispersity index

LFCS: Lipid formulation classification system

HLB: Hydrophilic lipophilic balance

GIT: Gastrointestinal tract

PEG: Polyethylene glycol

LC: Liquid crystalline

PVP: Polyvinyl pyrrolidone

HPMC: Hydroxypropyl methyl cellulose

CMC: Carboxy methyl cellulose

PDI: Polydispersity index

SFG: Sophora flavanone

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Author information

Authors and Affiliations

Department of Pharmaceutical Sciences, Hemvati Nandan Bahuguna Garhwal University (A Central University), Srinagar, Uttarakhand, India
Jyotsana Bhatt

School of Pharmacy, Graphic Era Hill University, Dehradun, Uttarakhand, 248001, India

Archana Dhyani

School of Pharmaceutical Sciences and Technology, Sardar Bhagwan Singh University, Balawala, Dehradun, Uttarakhand, India
Gauree Kukreti

Uttaranchal Institute of Pharmaceutical Sciences, Uttaranchal University, Dehradun, Uttarakhand, India
Sumit Durgapal

Himalyan School of Pharmaceutical Sciences, Swami Rama Himalayan University, Jollygrant, Dehradun, Uttarakhand, India
Ganesh Kumar

Contributions

Archana Dhyani: Conceptualization, Writing – review & editing. Jyotsana Bhatt: Writing – original draft Gauree Kukreti: Writing – review & editing. Ganesh Kumar: Supervision, Writing – review & editing. Sumit Durgapal: Supervising and editing.

Corresponding author

Correspondence to Archana Dhyani.

Ethics declarations

Conflict of interest

The authors declare no competing interests.

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