

EDIBLE INKS AND SUGAR-BASED SUBSTRATES: A NOVEL DRUG FORMULATION AND DELIVERY APPROACH FOR ACCURATE DOSING. OPTIMIZATION AND EVALUATION OF PROPRANOLOL FORMULATIONS

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Purpose

The general aim in this study is to test the feasibility of edible inks as a formulation base for drug substances and investigate the role of two different edible substrates as drug carriers for flexible dosing of propranol hydrochloride. Thermal inkjet printing is the technique chosen due to its high accuracy in dosing, the ease of use and the convenient price of the equipment.

Methods

The cartridge of a desktop inkjet printer (CANON iP 3600 PIXMA) was modified by adding propranolol hydrochloride as the API to the edible ink solution. The cartridge was then left at ambient conditions for 24 hours to ensure uniformity and homogeneity of the drug solution cartridge reservoir and in the sponge incorporated. The samples were prepared by thermal inkjet printing on two different substrates of edible icing sheet and edible rice sheet with different passes under the print head (4, 6, 8, 10, 12, 14, 16). The content uniformity of the prepared samples was tested by UV Spectrophotometry and the ISEs (Ion Selective Electrodes).

Results

The printer loads an average accurate amount of 0.0286 mg/cm²/printing pass of the API on the edible rice sheet substrate and an average accurate amount of 0.0341 mg/cm²/printing pass of the API on edible icing sheet substrates. The maximal printed dose of drug after 16 passes under the printer head, was 2.24 mg for edible icing sheet, and 1.64 mg for edible rice sheet. The resulting different drug amounts in each substrate was probably due to their composition and interaction with the substrate, as the edible icing sheet tends to retain more drug solution than the edible rice sheet.

Conclusions

Inkjet printing technique is suitable to print on almost any substrate and it could play an important role in flexible and personalized drug manufacturing approaches. Its main advantage is the precision and accuracy in deposition of the drug containing droplets on the substrates. It can be easily implemented as novel drug formulation and delivery approach to develop uniformly spaced and accurate solid dosage forms. This approach is suitable especially for drugs with a small therapeutic window or for patients with special-needs, such as with elderly persons, or pediatric patients.