A Novel Application of Three-Dimensional Printing in Personalizing Drug Dosage

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The inflexibility of fixed-dosage drugs hinders the way to a safer and personalized approach to mediate withdrawal symptoms, especially with medications having high dependency rates. This research aims to use 3D printing (3DP) to enhance drug administration and withdrawal by introducing a flexible dosing platform. A 3D printer and a novel poly-dissolve filament were used to fabricate drug tablets with different doses. Several designs of drug tablets were created, then the filament was loaded with cortisone, a model drug by the supersaturated solution method. The printed tablet's dimensions were measured using an electronic caliper to confirm if the printer achieved the targeted designs. The printed tablets were subjected to friability and hardness tests using hardness and friability testers to ensure their transport and handling capability. The drug concentration was measured in three printed tablets using a spectrophotometer. Lastly, two approaches were attempted to increase the drug loading. The results showed that the utilized 3D printer achieved the targeted design and quality. The friability of the printed tablets was 0% which ensured their structural integrity. The targeted concentration was achieved and was 1 mg/ml in each printed tablet. With 3DP technology, the personalization of administration and withdrawal is on a positive track. This new application of 3DP may benefit rehabilitation centers by enabling them to decrease the drug dose as desired, thereby avoiding harmful withdrawal symptoms or preventing addiction by giving the patient the exact dose they need.

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