

ABSTRACT

Preface: The method of drug administration has the most significant impact on the drug's bioavailability and, consequently, its efficiency. For this reason, relevant scientists are always searching for the best route to deliver medicine. In this regard, oral films capable of producing a modified release were developed to treat mouth ulcers, resulting in faster and more accessible treatment of these lesions. Producing these pharmaceutical forms using traditional processes, such as molding, resulted in considerable material waste, increasing company expenses and raising prescription prices for patients. Hence, considering modern technologies, such as 3D printers, resulted in developing therapeutic items such as mucoadhesive patches.

Research method: This study combined vegetal materials such as beeswax with polymers such as HPMC, PVP, and PVA to create the essential substrate for loading diphenhydramine hydrochloride. The patch was also produced using a 3D printer with a hot syringe. Since no organic solvent was used and the initial paste was rendered soft by heating it, this process produces safer patches than those made using other techniques. Additionally, physicochemical tests, including release tests, pH tests, toxicity tests and morphology tests were performed to assess the patches' quality and efficiency.

Findings: As a result of the use of polymers such as hydroxypropyl methylcellulose and polyvinyl alcohol with natural materials such as beeswax, forms were created with soft, flexible surfaces and long release mechanisms, whereby the medicinal content of these therapeutic forms is released over approximately five hours. Finally, MTT tests on patches obtained from this polymer formulation revealed that they were not toxic to lymphocytes.

Conclusion: The use of 3D printers in the pharmaceutical industry is considered a viable option due to the lower cost and higher efficiency of the products. The formulation of production patches with the used proportions had suitable conditions in the physicochemical tests. therefore, It was therefore concluded that the research overall had a positive result.

Keywords: Oral film, 3D printers, oral Aphthous, diphenhydramine hydrochloride, hydroxypropylmethylcellulose, polyvinyl alcohol, beeswax