Synthesis, Analysis, and Characterization of Electrically Sensitive PVA Hydrogels Loaded with MTX Cancer Drugs

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The objective of the project was to achieve controlled the drug release under different applied voltages. For this purpose, polyvinyl alcohol (PVA) hydrogels loaded with methotrexate (MTX) were prepared via solution casting process, and by introducing sulfoacetic acid, structure was rendered electrically sensitive. Characterization of the hydrogel was studied by fourier transform infrared (FTIR) spectroscopy and all the expected peaks were observed from the results. Electrosensitivity behaviors was observed via bending test. Moreover, drug release study was performed on the MTX-loaded hydrogel strips placed in a sodium chloride (NaCl) solution under different voltages (0V, 5V, 10V, and 20V) using ultraviolet-visible (UV-Vis) spectrophotometer. Finally, cytotoxicity study was performed by MTT assay. The UV-Vis results confirmed that the controlled drug release could be achieved under different electrical voltages. MTT results showed the effectiveness of MTX on breast cancer cells and biocompatibility of hydrogels. It also confirmed the results obtained from UV-Vis spectroscopy.