Abstract

The low approval rate of anticancer drugs in the cancer industry is due to the inaccuracy of preclinical models to clinical trials. Models such as 3D *in vitro* models have become a viable option since it is more customizable, especially since they can be 3D bioprinted. The use of biomaterials in 3D bioprinting has become an exciting alternative to tissue engineering and regenerative medicine. Biomaterials used in 3D bioprinting are used to create stable structures with increased biocompatibility, biodegradability, and enhanced supply while reducing immunogenicity and toxicity to use as different scaffolds, including 3D cancer models. While keratin and pectin are two biomaterials that have been used separately, they have never been used in combination as scaffolds for 3D cancer models. In this study, keratin and pectin were combined, made into hydrogels, were assessed for stable mechanical properties such as swelling, erosion endurance, self-healing abilities, and injectability. Cancer cell lines were also encapsulated in the keratin-pectin hydrogels to evaluate the cytocompatibility. The hydrogels were found to be a suitable candidate for a bioink, showing excellent water retention, and the ability to self-heal and undergo extrusion, the keratin pectin hydrogels also demonstrated cytocompatibility through the successful encapsulation of HT29 and HeLa cell lines. The keratin-pectin hydrogels have strong potential to become a preclinical cancer model, however, further optimization and standardization are needed.

Keywords: keratin, pectin, hydrogel, bioink, cancer model, cell encapsulation.