

ABSTRACT

Wounds are a rising health problem and may become non-healing wounds that require more complicated wound management. In wound management, wound dressing is one of the pillars of treatment in chronic wounds. There are currently many wound dressings, but each type has its own unique and there is no single ideal dressing for all wound types. An ideal wound dressing should promote moist wound environment, granulation, autolytic processes, angiogenesis, and rapid migration of epidermal cells (Dabiri *et al.*, 2016; Hilton *et al.*, 2004; Kaminski & Mendoza, 2018).

Recently, several studies have utilized various formulations to form novel wound dressing. Keratin accelerates wound healing and biocellulose (BC) serves moist wound environment, while tamanu oil provides additional antimicrobial and anti-inflammatory properties (Hartrianti *et al.*, 2017; Kucińska-Lipka *et al.*, 2015; Raharivelomanana *et al.*, 2018). Despite the promising properties of each material, to date, no studies reporting the combination keratin-BC and tamanu oil (KBC-Tamanu) for wound dressing.

In this project, BC from *Komagataeibacter intermedius* and keratin from human hair were obtained. The keratin was then incorporated into hydrogels via immersion and the tamanu was applied directly to the wound. The properties of those materials were assessed and resulted in acceptable hydrogel incorporation, antibacterial ability of tamanu, high water uptake, and adequate release of keratin. *In vivo* wound healing study was also conducted by assessing full-thickness wound closure and histological study in the mouse model. The results showed that keratin hydrogels enhance wound closure, but KBC-Tamanu has even more superior epidermis formation than other groups. However, the dermal remodeling was slower than the BC-Tamanu, which formed a thin layer of collagen fiber and was already lacking in inflammatory cells.