

CHAPTER I

INTRODUCTION

Wound dressing is one of the most popular to cover wound's surface, prevent bleeding, protect wounds from bacterial, keep moist environment at the wound surface, absorb wound exudates, and promote wound healing. Gauze is a traditional wound dressing. It is inexpensive and simple, but it can't create moist environment and blood bleeding. Hydrogel is also important dressing materials. It is widely used in biomedical applications such as wound dressing and tissue engineering scaffolds (Pawar *et al.*, 2012). For wound dressing, hydrogel appreciate for exuded absorption and creation a moist environment.

Alginate is a natural polymer. It is a linear unbranched polysaccharide that extracted from brown algae (Pawar *et al.*, 2012). It is a hydrophobicity, biocompatibility, non-toxicity and biodegradation. Alginate composes of two different blocks. First block is 1/4 linked β -D-mannuronic acid, M block. Another block is C-5 epimer α -L-guluronic acid, G block. There are 2 type of arrangement unit, homopolymeric (M-M and G-G block) and heteropolymeric (M-G block). Alginate that extracted from different source has also different amount of G and M blocks so the properties of them are different. Alginate had high amount of G block has well in mechanical properties. The gelation of alginate occurred with different ways as ionic crosslink (Bierhalz *et al.*, 2014, Goh *et al.*, 2012, Mørch *et al.*, 2006), chemical crosslink (Attwood *et al.*, 1989, Birnbaum *et al.*, 1981) and photo crosslink (Chou *et al.*, 2009, Jeon *et al.*, 2009). Many divalent cations can form ionic crosslink with carboxyl group in alginate. Several researcher reported divalent crosslink agent as Ca^{2+} , Sr^{2+} or Ba^{2+} . Crosslinked alginate by chemical crosslinking had well mechanical properties but it is also toxicity.

Calcium alginate (Ca-AG) is widely used in many applications. Wound dressing is one of calcium alginate's applications. Ca-AG can form hydrogel while suitable with exudates absorption. Previous studies reported Ca-AG can improve proliferation properties (Attwood *et al.*, 1989, Pedro *et al.*, 2002) and improve blood clotting (Attwood *et al.*, 1989, Ding *et al.*, 2013, Benavides *et al.*, 2012, Straccia *et al.*, 2014) but Ca-AG has poor antimicrobial properties (Zhao *et al.*).

Natural extracts have been widely used in antibacterial treatments such as *Barleria lupulina*, *G. mangostana* and *Hibiscus sabdariffa* (Chomnawang *et al.*, 2009). They report MIC and MBC value of Thai medical plant. *Garcinia mangostana* or Mangosteens (MT) is the highest efficacy to inhibit bacteria both negative and positive bacteria. Mangosteens (MT) are mostly found in Southeast Asia. The most important comprise in mangosteens is xanthenes. There are many researches about Mangosteen's properties for example anti-inflammatory properties, anti-fungal and anti-bacterial and promoting properties (Attwood *et al.*, 1989, Arunrattiyakorn *et al.*, 2011, Kaomongkolgit *et al.*, 2009).

In this work, the calcium alginate coated gauze incorporating with mangosteen extract was prepared in order to improve absorption behavior, blood clotting and antibacterial activities of simple gauze.