CHAPTER I
INTRODUCTION

In present, the wound dressings have more potential to keep wound healing naturally. There are many types of wound depending on wound appearance. The important factors taken into consideration in dressing selection are the wound site, surrounding skin, and exudate level. If a wound is exuding, a dressing needs to absorb and manage the levels of exudate, the extent of absorption varying with the dressing (Abdelrahman *et al.*, 2011). Dressing products now available in general are: semi-permeable film, non-adherent contact layer dressings, hydrocolloid dressings, alginate dressings, or hydrogel dressings, etc. All wounds heal differently; hence an individual approach to wound dressing selection is essential. In addition, oxygen permeability and antimicrobial have to be considered for healing the wound. The transparent film or semi-permeable film dressing (TFD) group showed a faster rate of wound contraction and reepithelialization and a shorter total healing time (Hien *et al.*, 1988). Moreover, film dressing that transmits moisture vapor at a rate lower than the rate of production of moisture by the underlying tissue creates a moist wound environment and also provide a protective environment, which is impermeable to bacteria and liquids and can stay in place for up to 7 days (Helfman *et al.*, 1994).

Antibacterial agent increasing more efficiency in antimicrobial for developing dressing is investigated. Nowadays, a lot of antibaterial agent had more studied in use for medical applications. In 2005, an improved wound dressing with a long-term drug diffusion-efficacy has been developed by UV-radiation technique incorporating with ciprofloxacin into 2-hydroxymethacrylate (HEMA) monomer which can inhibit both gram-positive and gram-negative at 0.5–2.0% (w/v) (Tsou *et al.*, 2005). In 2007, a collagen bilayer dressing with ciprofloxacin was prepared from succinylated type-I collagen so as to investigate the wound healing rate, bacterial population, biochemical and histological examinations of tissue samples which resulting in eliminates bacteria at the site of infection (Sripriya *et al.*, 2007). Thus, Ciprofloxacin (CPF) drug is considered in this research. Ciprofloxacin is one of the most widely used antibiotics in wound healing because of its low minimal inhibitory concentration (MIC) for both Gram-positive and Gram-negative bacteria that cause

wound infections and the frequency of spontaneous resistance to ciprofloxacin is very low (Unnithan *et al.*, 2012). However, the cytotoxicity of CPF examined viability of human fibroblast cells can still occur (Sousa *et al.*, 2001, Gurbay *et al.*, 2002). The essential oils were then studied to treat small to medium ulcers, skin tears, pressure sores and skin abrasions because it is significant results in regard to healing times, infection control and odour control (Kerr, 2002). In 2010, the effect of lucuma nut oil (LNO), one of essential oil, were evaluated on fibroblasts migration, inflammation, bacterial and fungal growth, and wound healing. *In vitro* studies showed that LNO significantly promoted migration and vinculin expression in human fibroblasts (Rojo *et al.*, 2010). Coconut oil is also interesting fruit which many previous studies researched in a lot of benefit of coconut oil. It has vast medical properties such as antibacterial, antifungal, antiviral, and also can be health promotion which can heal the human cells (DebMandal *et al.*, 2011). Coconut oil has a sweet-smelling which is different from other natural oil. Hence, coconut oil has enough ability to be promoter in dressing to maintain the skin for natural. In 2008, the combination of coconut oil and Silver sulphadiazine, significantly influenced the process of burn wound healing, it could be said that oil of *Cocos nucifera* could be a cheap and effective adjuvant to other topical agents, for attaining faster healing of wounds, without complications and also inhibited the bacterial growth (Srivastava *et al.*, 2008). Therefore, the combination of antibiotic and essential oil was interesting issue.

Electrospinning is a process which ultra-fine fibers with diameters in the micrometer down to nanometer range can be fabricated. This process involves the application of a strong electric field across a conductive capillary attaching to a polymer liquid-containing reservoir and a collector. (Suwantong *et al.*, 2008) Ultra-fine fibers obtained from this process exhibit various interesting characteristics (e.g., high surface area to mass or volume ratio, high density of micro- or nanometer-sized pores of the non-woven mat, and vast possibilities for surface functionalization). Poly(vinyl acetate)(PVAc), a biocompatible and biodegradable polymer, has also been used in biomedical applications, including drug and cell carriers, and tissue engineering. (Jannesari *et al.*, 2011) Moreover, it can be adhesive material for coating or attaching in various industries. Because of its non-toxic, it had applied to be adhesive glue for many medical applications. According to electrospinning properties,

it can increase more efficiency of adhesive glue which is not effect to the ordinary of PU film for using in wound dressing.

The purpose of this work is to develop the wound dressing with antibacterial adhesive electrospun layer and to investigate the antibacterial and mechanical properties of obtained wound dressing. It could be not effect to reepithelialization or cell growing and also can inhibit bacterial growth for development of new dressing in present.