

CHAPTER I

INTRODUCTION

A wound is a break in the continuity of the tissue of the body, either internal or external. There are various types of wound such as incised wound (surgical incision and non-surgical wounds), lacerated wound, abrasion, contusion, ulcer and burned wound (Leaper and Gottrup, 1998). Most incised wound can be closed within 6-12 hours providing that they are not contaminated (Leaper and Gottrup, 1998). Burned wound needed treatment according to the severity of burn, minor burns are generally treated with topical ointment and dressing while severe burns are considered an emergency, requiring hospitalization (Pharmacy & Health: Health Guide, 2002). According to the National Consumer Commission, two million people worldwide receive skin burns each year. Furthermore, 100,000 skin burn victims will require hospitalization and unfortunately 12,000 of these cases are not expected to survive. Knowing these facts, it is apparent that many people who receive skin burns, whether major or minor, are unaware of how to care for and prevent them from happening (Casteel, 2002). Inappropriate caring of wound may delay its healing, getting infection and finally, becoming a chronic wound (Panchinda, 1992).

Development of drugs or agents to treat wound has been continuously going on. Some agents are found to be useful in the treatment of wound such as: 1% silver sulfadiazine cream, the topical antimicrobial agent, has long been used in Thailand. It can inhibit DNA replication, cell membrane and cell wall modification. Though it is a broad spectrum antimicrobial, it has the disadvantage of not being absorbed through eschar. Thus, it is not effective in the wound that has eschar or infection. The side effects of this agent are rash and transient leukopenia. Due to bone marrow suppression, the use of silver sulfadiazine in G6PD patient may cause hemolytic anemia.

Mafenide acetate is used to treat gram positive and gram negative bacterial infection. It can be absorbed through eschar better than silver sulfadiazine. However, it is not commonly used as a first line drug, because of the side effects such as pain and irritation at wound site occurring within 20-30 minutes after the application of the drug. Furthermore, metabolite product of mafenide acetate (p-carboxybenzene sulfonamide, the strong carbonic anhydrase inhibitor) can cause metabolic acidosis. Thus, it is not currently available in Thailand.

Another agent, silver nitrate in the form of 0.5% solution (hypotonic solution) is used to treat wound by releasing the silver ion which subsequently precipitated bacterial protein. This agent is effective against many kinds of bacteria; however, due to limited absorption of the agent through the eschar it is used in the initial stage of treatment when bacterial colonization is not abundant. Another disadvantage is hyponatremia (Chaiyaphruk, 2003).

Thailand has many kinds of herbal products which have long been used in traditional medicine. The government has tried to build up self-reliance on drug supply by promoting the uses of traditional medicine. Medicinal plants have been integrated into health care especially primary health care system. Various plants are recommended to be grown and used in the households and community hospitals. Among these plants *Centella asiatica* (Linn.) Urban (CA) is recommended for wound treatment. CA, belonging to Umbelliferae family, is commonly found in many parts of India, Asia and the Middle East (Somchit, 2004). It is known as Asiatic pennywort, Bua bok, Pa-na-e-khaa-doh (Karen-Mae Hong Son), Phak waen (Southern), Phak nok (Northern) (Farnsworth and Bunyaphatsara, 1992). It is perennial, herbaceous creeper growing up to 30 cm in height with fan-shaped leaves (Somchit, 2004). CA has been used in traditional medicine in Asia such as India, China and Indonesia for hundreds of years (Cheng and Koo, 2000). Its ability to heal wounds, improve mental clarity, and treat skin conditions such as leprosy and psoriasis were rational for its extensive use. It has also been called one of the 'miracle elixirs of life' as it was believed that ancient Chinese herbalist had lived for more than 200 years as a result of using the herb.

Historically, CA has been used to treat syphilis, hepatitis, stomach ulcers, mental fatigue, epilepsy, diarrhea, fever and asthma. Today, American and European herbalists use CA for disorders that cause connective tissue swelling, such as scleroderma, psoriatic arthritis (arthritis of the spine), and rheumatoid arthritis (Hart, 2004). The substances of therapeutic interest are the saponin-containing triterpene acids and their sugar esters, the most important being: asiatic acid, madecassic acid and the three asiaticosides; asiaticoside, asiaticoside A and asiaticoside B (Brinkhaus et al., 2000). In Thailand, this herb is commonly consumed fresh as a vegetable or as a beverage. The claimed efficacies in Thai traditional textbooks are as follows: for health promotion; treatment of skin diseases, wounds, and vaginomycosis; as cardiogenic, diuretic, antidysentery, antidiarrhoeal, blood purifier, and antisnake venom (Farnsworth and Bunyaphatsara, 1992).

Kosalwatna et al. (1988) reported that 1% CA extract cream could improve wound healing in chronic ulcer in width, length and depth after dressing the cream at day 7, 14 and 21 and the healing rate of the depth is faster than the other two dimensions by about 20%. Later on Shukla et al. (1999) found that asiaticoside isolated from CA increased hydroxyproline content, tensile strength, collagen content and epithelialization in punch wound model thereby facilitating the healing. Effect of the extract of CA on acute radiation dermatitis in rats has been studied by Chen et al. (1999) who concluded that wound in treatment group were less severe and repair began earlier than in the control group. Furthermore, the study of Maquart et al. (1999) showed that triterpenes from CA were able to increase remodeling of the collagen matrix and stimulate glycosaminoglycan synthesis in rat wound chamber model.

However, there are few studies that investigate the effect of CA on incision wound and no studies have been carried out on burn wound which has a particular healing mechanism different from excision wound. Thus, the purpose of the present study was to investigate the effects of the extract from CA on wound healing in incision wound model and burn wound model in rats.