

Fluid Intake Capacity of Aloe Vera and Sea Cucumber Thin Film

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Abstract. Aloe Vera and sea cucumber are the natural material which has been used widely in bio-medical field in Malaysia, especially for wound healing purposes due to its therapeutic effects. Recently, thin films which can absorb acceptable amount of fluid has been gaining attentions in biomaterial wound dressing applications. Hence, the incorporation of these natural materials in the fabrication of the thin films were investigated regarding the fluid intake capacity under the condition of being in contact with deionized water and pseudo-wound exudate. Three types of films made of different compositions of Aloe Vera and sea cucumber were prepared and evaluated. The morphology of the films was analysed using the Scanning Electron Microscopy (SEM) evaluation and the fluid intake capacity through the Free Swell Absorptive Capacity test. Results showed the variety of fluid intake capacity of different type of the film after being immersed in both solutions. The morphological structure of each film also varied from one another. The result also indicated that the Aloe Vera film held the adequate fluid intake capacity without any degradation behaviour.

Introduction

Every year, the rate of tissue failure and losses due to severe wounds such as injury and burning are increasing. This phenomenon leads to the escalating use of the wound dressing which driving the growth of the market. In 2011, the global wound dressing market was estimated to be worth \$12.8 billion and expected to grow with compound annual growth rate of 5.3% from 2011 to 2017 [1,2]. Three categories of wound dressing such as biologic, synthetic and biologic synthetic are used frequently in the medical field despite of their disadvantages.

Wound dressing should possess several characteristics such as good biocompatibility, allowing gaseous exchange, can maintain the moist environment at the wound interface, easily removed, made with minimal processing, resulting a good physical property and promotes wound healing [3]. Besides that, the ideal wound dressing should offer rapid healing with a minimal inconvenience to the patient.

Fluid intake capacity of wound dressing is recognized as the important properties for its ideal requirement. Wound dressing should offer the high absorbency of wound fluids in order to prevent more damage to wound area [4]. The ability of wound dressing to absorb excessive wound exudate can also reduce the regularity of changing the dressing, thus minimized the treatment cost and nursing time [5,6]. The incorporation of natural material such as Aloe Vera and sea cucumber is an interesting approach which can enhance the properties of the wound dressing in terms of the therapeutic effects and the fluid intake capacity.

Aloe Vera gel consists mainly of water (>98%) while the remaining 0.5-1% solid materials consists of compounds such as water-soluble and fat-soluble vitamins, minerals, enzymes, phenolic compounds, organic acids and polysaccharides; including pectin, cellulose, hemicellulose, glucomannan, and acemannan [7-9]. It gives soothing and cooling effects which makes it suitable to treat wounds, minor cuts, dry skin and severe burns [10,11]. The clinical effectiveness of Aloe Vera gel increases the quality of wound healing products [12]. In the wound dressing industry, Aloe Vera has been used widely as the result of anti-inflammatory, anti-bacterial and the wound healing effects [13,14].

Sea cucumber have been used for folk medicine in Asia and Middle East since centuries [15]. Sea cucumber contained many nutrients such as Vitamin A, Vitamin B1 (thiamine), Vitamin B2, Vitamin B3 and minerals [16,17]. Sea cucumber possess activities which include anti-angiogenic, anti-