STABILITY AND ABSORPTION PROPERTIES OF MANGO FILM DRESSINGS

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Abstract - Mango (Mangifera indica L.) seed kernel has proper pharmacological properties for wound healing. In the present study, the aqueous extract of ripe Chokanan and Namdokmai mango seed kernels was chosen to develop a mango-gelatin film dressing at different proportions. Our results revealed that the mango extract concentration had an effect on the stablity of the film dressing and the gelatin concentration had an effect on the absorption capacity. The 40% mangofilm dressing is found to have the highest stable structure but have the lowest absorption capacity.

Keywords - Absorption, Film dressing, Mango seed kernel, Stability

I. INTRODUCTION

Film dressing is a transparent sheet which allows for assessment of wounds [1]. Natural polymers are commonly used to develop film dressings, especially gelatin. Gelatin sheet is good cytocompatibility and able to stimulate wound healing [2]. Mango (Mangifera indica L.) is grown mainly in tropical Asia. Mango seed kernels are normally disposed as waste. Interestingly, they are rich in proteins and show anti-inflammatory and anti-bacterial properties that good for wound healing applications [3]. Therefore, the present research work aimed to develop and evaluate stability and absorption properties of a mango-gelatin film dressing at different proportions.

II. MATERIALS AND METHODS

2.1. Chemicals and plant materials

Gelatin (~ 250 bloom) was purchased from Chemipan Corporation Co.,Ltd. (Bangkok, Thailand). Other reagents were analytical grade. Mango seed kernels ofChokanan and Namdokmai were collected from Pathum Thani, Thailand.

2.2. Extraction of mango seed kernels

The ripe mango seed kernel waswashed and dried at 60°C for 24 h. Then, the mango seed kernelwas powdered and the powder was extracted with deionized water using a shaking method at 125 rpm for 48 h. The extract was centrifuged at 5000 rpm for 1 h and the supernatant was collected. This supernatant was concentrated using a hot plate at 80°C with stirring until its volume has decreased by 50%.

2.3. Preparation of films

The films were prepared by casting technique at different proportions of gelatin (10% w/v) and mango extract as shown in Table I and air dried at room temperature.

Table I: Composition of prepared films

Sample No.	Chokanan mango	Namdokmai mango	Gelatin
1	-	-	100%
2	10%	-	90%
3	20%	-	80%
4	30%	-	70%
5	40%	-	60%
6	-	10%	90%
7	-	20%	80%
8	-	30%	70%
9	-	40%	60%

2.4. Stability and absorption properties

To evaluate the stability, the film (2 × 2 cm) was immersed in pseudo-wound exudate (0.142 mol/L NaCl + 0.0025 mol/L $CaCl_2 2H_2O$) and incubated at 37°C. After that, the stability of film was visually evaluated until it has disappeared.

To evaluate the absorption, the film (2 × 2 cm) was also immersed in pseudo-wound exudate and incubated at 37°C. At different periods, the film was weighed. The experiments were performed in triplicate and all quantitative data represent the mean ± standard deviation.

III. RESULTS AND DISCUSSION

The composition of mango-gelatin and gelatin films is shown in Table I. The stability of film was increased with increase in mango extract concentration in both mango varieties (see Table II). The 40% mango film was more stable structure than the others. Nevertheless, all 40% mango films were degraded at 24 h.The absorption properties of the film at different periods are shown in Fig I.The absorption capacity was decreased with a decrease in gelatin

concentration in both mango varieties. It may be because of swelling behavior of gelatin [2]. The gelatin film without mango extract could absorb a high amount of wound exudate. However, all gelatin films were degraded at 12 h. Therefore, future studies need to change the method to concentrate the mango extract such as using a rotary evaporator to make film more stable[4].

CONCLUSION

This is the first study to demonstrate the association between mango extract concentration and stability of the film. The stability of film was increased with increase in mango extract concentration. However, the mango extract and gelatin ratio should be at an appropriate amount to obtain good absorption properties.

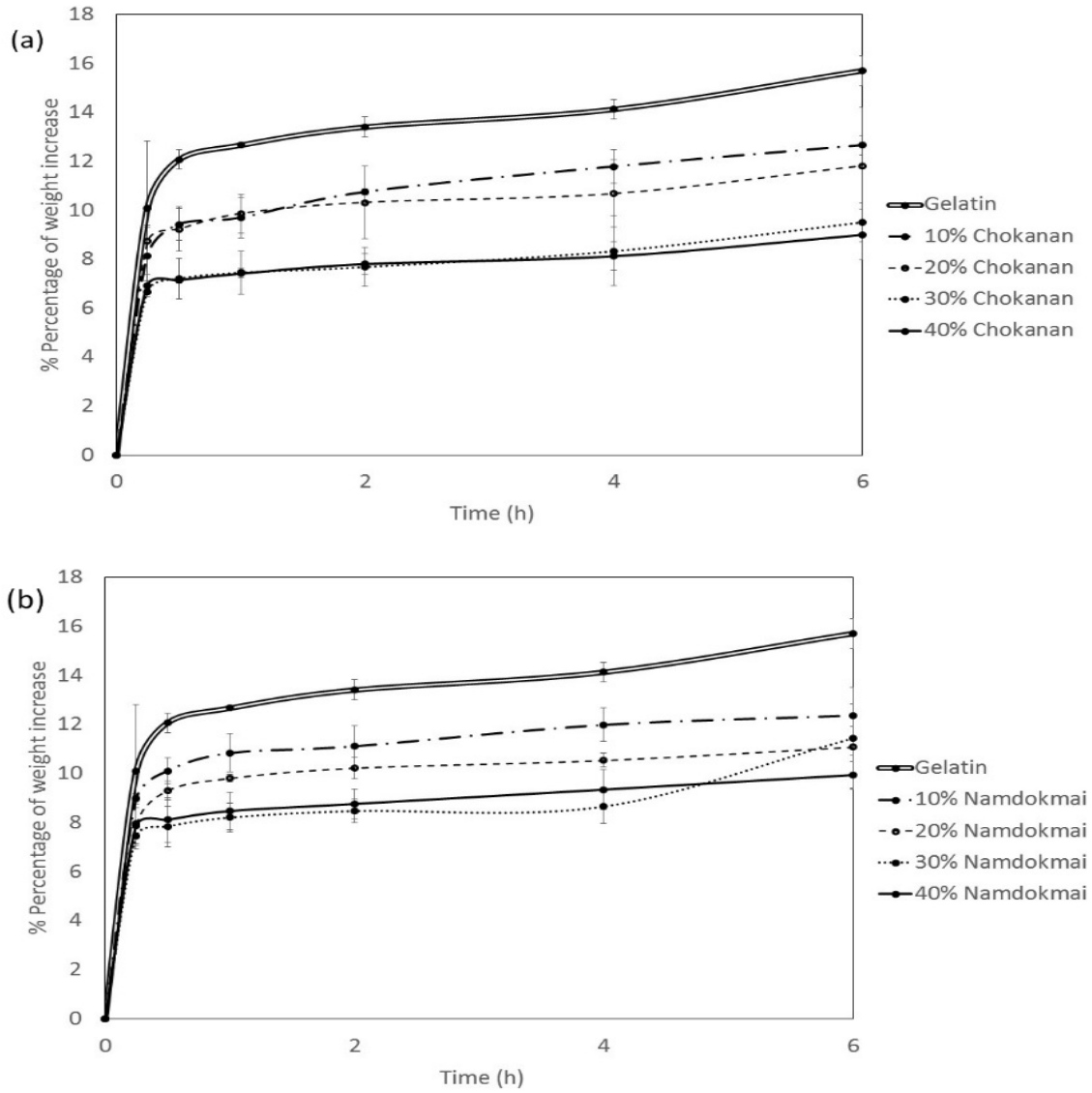

Fig. I: Absorption properties of (a) the Chokanan and (b) Namdokmai films

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