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### A MIXTURE OF ESSENTIAL OILS OF *POGOSTEMON CABLIN*, *JASMINUM SAMBAC* AND *ZINGIBER OFFICINALE* AS A REMEDY FOR CELLULITE

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#### ABSTRACT

Cellulite is an aesthetic problem which occurs in 85% of Asian women over the age of 20 years and most often found in the area of the thigh, buttock and stomach, which its treatment is expensive and can cause many side effects. The objective of this experiment was to determine the effect of the mixture of essential oil of patchouli (*Pogostemon cablin*), jasmine (*Jasminum sambac*) and ginger (*Zingiber officinale*) in reducing the sign of cellulite. The efficacy test was conducted using open label comparative clinical trial with inter-subject design, single blind on 21 women subjects with cellulite of 1-3 degrees. The mixture containing essential oils with a concentration of 1% each was applied to subject's skin for 28 days and observed for the irritation symptoms and effects on cellulite by circumference measurements, skin roughness (depth of wrinkles) and photography. The results showed that the mixture did not irritate the skin and significantly reduce the thigh circumference measurements and skin roughness ( $p < 0.05$ ). The photographic data showed that there was an improvement in skin surface appearance, although the degree of cellulite has not been changed.

#### KEYWORDS

*Pogostemon cablin*, *Jasminum sambac*, *Zingiber officinale*, Cellulite, Skin roughness and Photography.

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#### INTRODUCTION

Cellulite is a skin condition that causes fat trapped below the dermis, causing small clumps that look like orange peel or mattress appearance<sup>1</sup>. In this condition, alterations occur to the adipose tissue and micro circulation that result from blood and lymphatic disturbances causing fibro sclerosis of the connective tissue. It is considered a non-

inflammatory, degenerative phenomenon that provokes alterations to the hypodermis producing irregular undulations on the skin overlying affected areas. Cellulite results from many complex events that involve the epidermis, dermis and subcutaneous tissue<sup>2</sup>. Cellulite can be divided into four stages<sup>3</sup>:

- First degree is asymptomatic, there is no change in the clinical, histopathological changes only, pinch test +.
- Second degree is the 1<sup>st</sup> degree followed by pale skin, decreased skin elasticity/contraction of muscle, pinch test ++.
- Third degree is the 2<sup>nd</sup>, which at rest would look like orange peel and a decrease in skin elasticity, pinch test +++.
- Four degrees is the 3<sup>rd</sup> with palpable nodules more clearly, look and feel pain, at rest looks basin, bumpy skin on the surface at rest (mattress phenomenon), pinch test ++++.

Cellulite occurs mainly in women especially after puberty and in obese people, being considered a normal manifestation of obesity<sup>4</sup>. There is evidence to suggest that estrogen is the element most probably involved in the initial dysfunction, aggravation and persistence of cellulite<sup>2</sup>. The lesions are essentially asymptomatic. However, in an advanced degree of cellulite, symptoms such as a sensation of weight and pain may occur in the affected areas. These probably occur as a result of compression of the nervous terminals or the presence of inflammatory reactions. Discomfort and aesthetic factors encourage patients to receive any type of treatment to tackle cellulite. The use of topical cosmetic from plant material that has the effect to improve the micro circulation in the dermis and accelerate the lipolysis of subcutaneous fat with massages will give a synergistic effect against the improvement of cellulite symptom<sup>1</sup>.

This study uses the essential oils of patchouli Aceh (*P. cablin* Benth), jasmine (*J. sambac* L. Aiton) and red ginger (*Z. officinale* Roscoe var. *sunti* Valeton) that were selected based on aroma and its function in reduce the symptoms of cellulite. To obtain a synergistic effect, an equitable aroma and safe to apply on body, used a concentration of 1% each of

the essential oils and should be diluted in 30 ml of carrier oil<sup>5, 6</sup>. Selected as carrier oil is coconut oil (*C. nucifera*) because it can be easily absorbed into the skin, it doesn't aggravate the skin, can reduce the evaporation of essential oils, easily found and the price is quite cheap.

The aim of this study is to prove the efficacy of the essential oils mixture of patchouli, jasmine and ginger with a concentration of 1% each respectively in women subjects aged 20-40 years, is more effective compared to the coconut oil in reducing thigh circumference, skin roughness by measuring the depth of wrinkles, symptoms of cellulite by looking at photographic data.

In this paper are reported two trials aimed at evaluating clinically and instrumentally the effects of different orally administered multi functional plant extracts-based formulations in the treatment of cellulite compared with a placebo, used coconut oil.

## MATERIAL AND METHODS

### Plant and Oils Collection

*Zingiber officinale* Roscoe var. *sunti* Valeton were collected in Desember 2012, from the Center for Plant Conservation, Indonesian Institute of Sciences, Citereup, Bogor, West Java. Botanical determination was done by Indonesian Institute of Sciences, Citereup, Bogor and a voucher specimen was deposited at the Herbarium of Pharmacognosy Laboratory, Faculty of Pharmacy, University of Indonesia. The rhizome was distilled at the Indonesian Medicinal and Aromatic Research Institute, Bogor. The essential oils of *Pogostemon cablin* (patchouli) and *Jasminum sambac*, from PT Martina Berto, Tbk. The essential oils mixture (EOM) was preparation from the three essential oils, 1% each in coconut oil as carrier.

### Clinical Study

#### Design

The design of this study is open label comparative clinical trial with inter-subject design, single blind, conducted at Dermatology Laboratory of Assetra Inno Medikos, Bekasi, West Java. The protocol of the study was approved by the Ethics Committee of Faculty of Medicine University of Indonesia.

## Methods

Before started with the intervention all the subjects were got irritation test to the EOM. The informed consent was explained to the subjects and they agreed to participate by signing the form. All subjects used the EOM in one of the gluteal fold area and the other for the placebo for 28 days continuously. At the beginning and ending of the treatment (T-0 and T-28) all the subjects were observed to determine the grade of their cellulite and first measurement for their thighs circumferences, skin roughness (depth of wrinkles) and photography. A measuring tape was used to measure the thighs circumferences at 5-10 cm below the gluteal fold. The Visioline VL 650 apparatus used for measure the skin roughness and the photographs were taken to determine the differences of the cellulite before and after treatment.

## Subjects

Inclusion criteria subjects were women aged ranged from 20-40 years old with the body mass index (BMI) 20-27; has 1-3 a degree of cellulite. The subjects had no history of allergy and irritation to the substance being tested. They were not using other medications that could affect/interfere test results (eg. non-inflammatory drugs such as steroids, birth control pills or other hormonal drugs). They did not consume alcohol and signed the informed consent. The exclusion criteria were subjects who have a history of edema, being on a strict diet, taken diet pills and doing heavy exercise, smoking, pregnant and lactating women<sup>7</sup>.

In addition, there are drop test criteria/drop out (DO) of the subjects who did not complete the process of data collection, appear an allergic reaction or other serious side effects, withdrawal from research participation, or subjects who have incomplete data. Termination of research was done when all subjects completed the study and followed all the procedures that have been established. Subjects were asked not to wear any kind of cosmetic products in both of the test area for 1 week before the study and washed the test area using baby soap before application of the essential oil mixture (EOM) and control oil (CO).

The study was conducted according to Good Clinical Practices.

## Statistical Analysis

The data were collected and analyzed by pair t-test (values at T-0 versus T-28 and treated values with the EOM versus the coconut oil). A p-value of less than 0.05 was taken to indicate as significance.

## RESULTS AND DISCUSSION

Variations in hormones between genders largely explain this skin structure deviation. It has been shown that men who are born deficient in male hormones will often have a subcutaneous fat cell appearance similar to females<sup>8</sup>. Men and women have a different connective tissue organizational structure at the first layer of subcutaneous fat<sup>9, 10</sup>. With females, the adipose tissue is contained in chamber-like structures that favor the expansion of adipose tissue into the dermis. Contrariwise, men have a network of criss-crossing connective tissue architecture, forming smaller polygonal units which allow for subcutaneous fat deposits to expand laterally and internally, but with little protrusion (if any) into the dermis. As well, men have thicker epidermis and dermis tissue layers in the thigh and buttock than females<sup>8, 10</sup>.

## Irritation Test

A total of 25 subjects were selected in accordance with the above inclusion and exclusion criteria. Irritation tests with the method of 4-hour closed patch test on the back of subjects<sup>11</sup> using the EOM. Evaluation of the skin reaction is done after 30 minutes, 24 hours, 48 hours and 72 hours after the patch removal in accordance with the standards used. The result showed that one subject experienced mild irritation reactions in the form of erythema (redness) which appeared 30 minutes after patch removal, but it was no longer seen on the next evaluation. It means that the EOM could be well tolerated by the subject, but for efficacy study, this subject is not included.

As in previous publication, it stated that the use of some types of essential oils topically through the skin in a short time and with the appropriate dilution should not cause irritation reaction in subjects,

except for subjects who have a history of allergy or previously experienced a sensitization<sup>12</sup>. The use of drugs and household products also affect the occurrence of adverse reactions from essential oil, depending on the variation of tolerance, but dermal irritation that is caused by essential oils are usually on one place and occurs on short duration<sup>13</sup>.

#### **Efficacy Test of the EOM on Cellulite Symptoms**

Efficacy test was conducted on 24 subjects who had no skin reaction in the irritation test. Three of them had to drop out because they did not follow the study rule and not completed the study, so that their search results of the analysis carried out on 21 subjects.

#### **Thigh Circumference Measurement**

Efficacy test was conducted of the EOM and CO treatment for 28 days on 21 subjects by measuring the thigh circumference in a state of loose and tight (Table No.1).

The average reduction in thigh circumference was 1.61 cm in loose state and in the tight state is 1.52 cm. The decrease in thigh circumference may be influenced by sudorific and diuretic properties owned by one of the EOM<sup>14, 15</sup>. Compare to the oil CO treatment, the thigh circumference were not significantly decreased.

#### **Skin Roughness Measurement**

As seen in Table 2, after 28 days treatment with the EOM, the skin roughness of thigh was significantly decreased by 4.42 mm. While with the CO, the skin roughness was decreased by 0.47 mm and this decreasing was not significant.

From the above results, it is shown that the thigh circumference and the skin depth of wrinkles can be reduced after using the EOM for 28 days.

Compared with the other study using essential oils of lemon, patchouli, lavender and rice to reduce cellulite, the thigh circumference decreased by 1.7 cm after 12x treatments for 6 weeks and decreased skin roughness by 27.8% after 4 weeks<sup>16</sup>. Similarly, in other studies on cellulite using ginger extract and

caffeine, there is a decrease in thigh circumference by 1.9 cm<sup>17</sup>.

#### **The Photography Data**

As shown in Figure No.1, the appearance of the cellulite was improved after the use of the EOM, even though this improvement could not change the degree of cellulite to a lesser degree.

Figure No.1 showed a change in the skin of cellulite area. The appearance of the skin looks better in the stated of T-28 compared to state T-0 using the EOM treatment. Meanwhile, based on interviews with self evaluation conducted after the use of the EOM, all the subjects stated that their skin smoother than before treatment.

To determine the efficacy of the EOM and the CO in reducing the size of the circumference of the subjects' thigh, the measurement of weight and height was done to see its effect on BMI in a state of T-0 and T-28. From statistical analysis, there were no significant different found before and after the use of oils, see Table No.3.

The mixture of patchouli, jasmine and ginger as the EOM had efficacy in reducing the symptoms of cellulite with massage. Patchouli contained in patchouli oil helps tightening skin and smoothing the rough, dry and cracked skin and repairing blood vessels and lymph circulation. Moreover, it also serves to reduce inflammation, improve aging skin and scar tissue repair through regeneration of skin cells that have a sudorific and diuretics effect that is effective for reducing cellulite<sup>18, 19</sup>. Linalool and benzyl acetate contained in jasmine oil works to improve skin irritation and moisturize skin, build collagen and prevent fat accumulation that may help prevent the formation of cellulite<sup>20</sup>. Zingiberene, curcumene and citral contained in ginger oil functions as an antioxidant that helps neutralize the damaging effects caused by free radicals and as an anticoagulant to prevent blood clots or accelerate blood flow<sup>21</sup>.

**Table No.1: The Efficacy of the EOM and CO on Loose and Thigh Circumstances (n = 21)**

Observation period	Thigh circumference in standing position (cm)		Thigh circumference in standing position (cm)	
	Loose circumstances		Tight circumstances	
	CO	EOM	CO	EOM
T-0	49.62 ± 1.09	49.90 ± 1.17	47.48 ± 1.01	47.90 ± 1.09
T-28	48.95 ± 1.00	48.29 ± 0.87 <sup>a</sup>	46.81 ± 0.95	46.38 ± 0.83 <sup>b</sup>

**Note:** CO: Control Oil; EOM: Essential Oil Mixture; T-0: Before using the oils; T-28: After using the oils

<sup>a</sup> Significant at P < 0.05 compared to CO

<sup>b</sup> Significant at P < 0.05 compared to CO

**Table No.2: The Efficacy of the EOM and CO on Roughness of Tight Skin (n = 21)**

No	Observation period	Skin roughness of thigh (mm)	
		CO	EOM
1	T-0	67.64 ± 3.07	68.34 ± 3.59
2	T-28	68.10 ± 2.27	63.92 ± 2.29 <sup>a</sup>

**Note:** CO: Control Oil; EOM: Essential Oil Mixture; T-0: Before using the oils; T-28: After using the oils

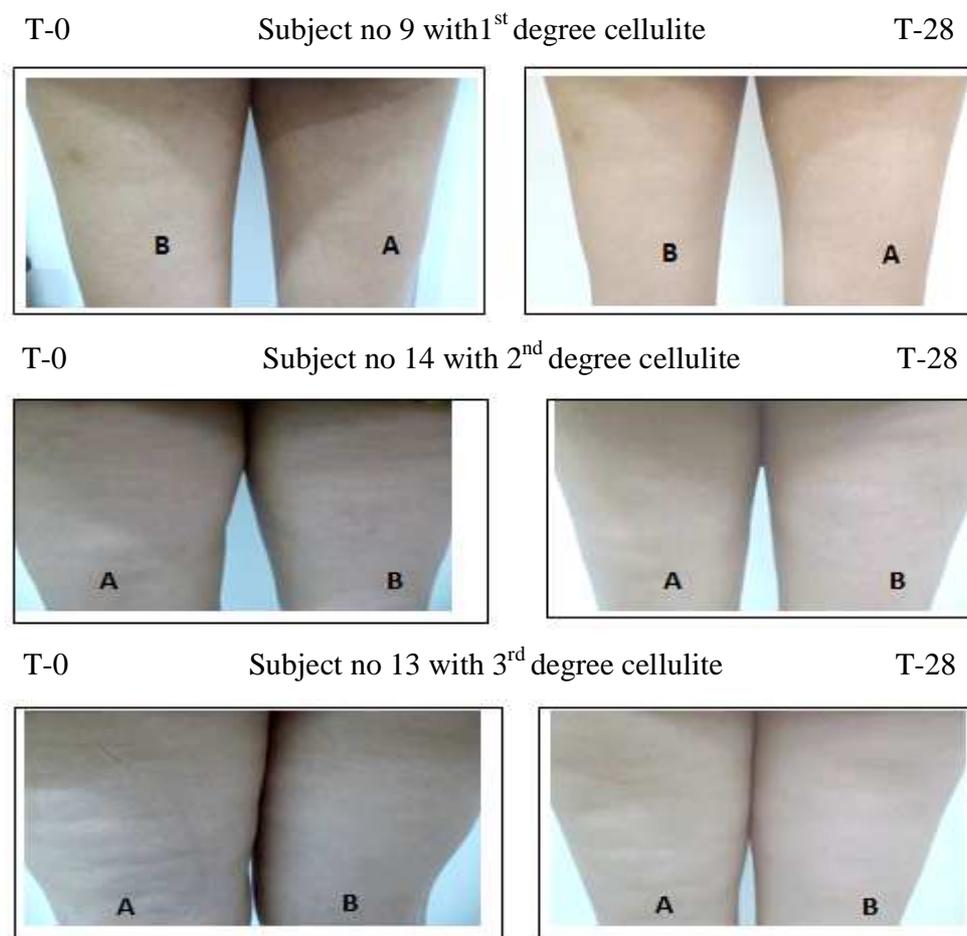
<sup>a</sup> Significant at P < 0.05 compared to T-0.

**Table No.3: Statistical Test Result of BMI before and After Using the Oils (n = 21)**

No	Observation Period	BMI
1	T-0	23.27 ± 0.41
2	T-28	23.12 ± 0.39 <sup>a</sup>

**Note:** T-0: Before using the oils; T-28: After using the oils; BMI: Body Mass Index

<sup>a</sup>No significant at P > 0.05 compared to T-0.



**Figure No.1: Subjects test efficacy**

**Note:** A: CO (Control Oil); B: EOM (Essential Oil Mixture); T-0: Before using the oils;  
T-28: After using the oils

## CONCLUSIONS

The mixture of patchouli, jasmine and ginger essential oil with the concentration of 1% each in coconut oil followed by massage is more effective in reducing cellulite symptoms on women subjects compared to coconut oil. The appearance of the cellulite skin are smoother which showed on photographic data, even though the degree of cellulite has not diminished.

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