

Sterile Gel Propolis *Trigona* Spp as Drug for Wound Burns

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ABSTRACT

Background: Propolis is a natural resin that was collected and used by bees *Trigona* spp to build and maintain its nest, is a good candidate to treat burns. Propolis used as a healing wound since the late 19th century in battle caused by of the nature of antiviral, antioxidant, antimicrobes, and anti-inflammatory and it contains potential activity of healing scar from Propolis that has been developed by using extract Propolis into the shape of preparation that was portable, effective and comfortable. Purpose: Research aims to understand the efficacy of sterile gel Propolis *Trigona* spp in healing of wound burns. Method: Effectiveness test of wound burns was conducted with the method morton using animal experiments of the white rabbit female race New Zealand, where the percentage of healing observed from first day until the day of 38th. Result: The effectiveness of sterile gel preparation that have been made shows that 69,86 % given by formulation 3 (F3) which was contain 10 % of extract Propolis *Trigona* spp, while the percentage healing for control negative with 53,42 %. Conclusion: Propolis *Trigona* spp having an aspect of strategic and economic value in handling wound burns with raw standard materials that could potentially work as a product of superior medicinal herb and having high economic competitiveness based on Indonesian natural resources.

Keywords: Morton method, propolis *Trigona* spp, sterile gel, wound burns.

INTRODUCTION

Propolis is a natural resin that is collected and used by bees *Trigona* spp to build and maintain its nest, is a good candidate to treat burns^{1,2}. It is caused by the antiviral, antioxidant, antimicrobial and anti-inflammatory conceived by Propolis¹⁻⁶. In addition of agglutinating ferulic acid (a substance that accelerates blood clotting) and arginine (substances that facilitate the circulation and cell respiration to regeneration) in Propolis concentration of 4-5% is proven to accelerate tissue repair, reduce local inflammation, and stimulate the production of fiber Collagen⁷. The efforts to find bioactive compounds from natural materials of Indonesia that having drug activity in burns due to the use of bioactive substances from natural materials tends to have its renewable, easily decomposed and effective.

Research using propolis extract *Trigona* spp has been reported as a medicine burns and has a strategic aspect, where this can increase the potential of propolis extract standardized to the development of standardized herbal drug candidates. Therefore, the results obtained can be used to further study the use of propolis, which is based on mechanism-based therapy approach that ultimately may be an alternative treatment of burns safely through security testing and quality associated with the use of propolis *Trigona* spp. In terms of economic value in this study, will get one of the effective methods, efficiency and safety in dealing with burns, and obtained a standardized raw material potential as raw material drug products featured countries that have high economic competitiveness based on natural resources.

MATERIALS AND METHOD

Formulation and Preparation of Sterile Gel Propolis Trigona spp.

Sterile gel formulation was done by an aseptic process. Design gel was made from the most effective formula of previous studies in which the Propolis extract as an ingredient with the concentration of 5 % on the basis of the selected optimization results as the basis of preparation of the formula gel⁷, which can be seen in Table 1.

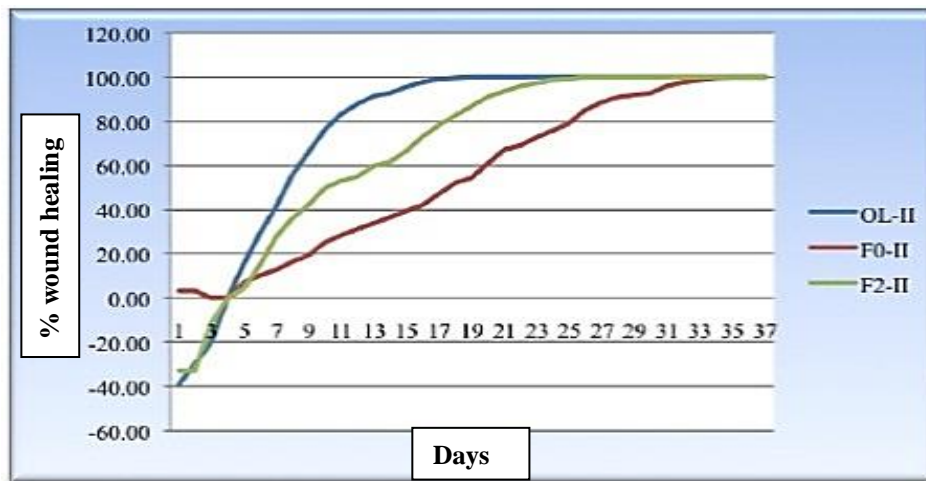
The Pharmacological Activity of Propolis Trigona spp Sterile Gel Preparation.

Testing the effectiveness of pharmacological preparations of sterile gel propolis on wound healing, Morton preclinical testing method have been used by the model of wound burns on the backs of rat. The total number of rats that have been used in this preclinical test was eight rats. All the lab rats used in this research, the back part of rats was shorn the day before wound made and given anesthesia with Acepromazine in intermuscular. The right and left halves back of rats were shaved and cleaned with ethanol 70 %, then each halves was given stimuli of heat with a Combustio inductor inducer (CI-AY) at 80 °C for 1 min. Testing rabbits were divided into 3 groups in which each group contains 2 rabbits. The parameters that were used was downsizing the diameter of the wound every day, then calculated the statistical data. Positive control that been used as comparison is a drug that already on the market. On every group, each back of rabbits is made to 3 location of wound burns, the first location was control negative which was smeared with gel F0 (gel without

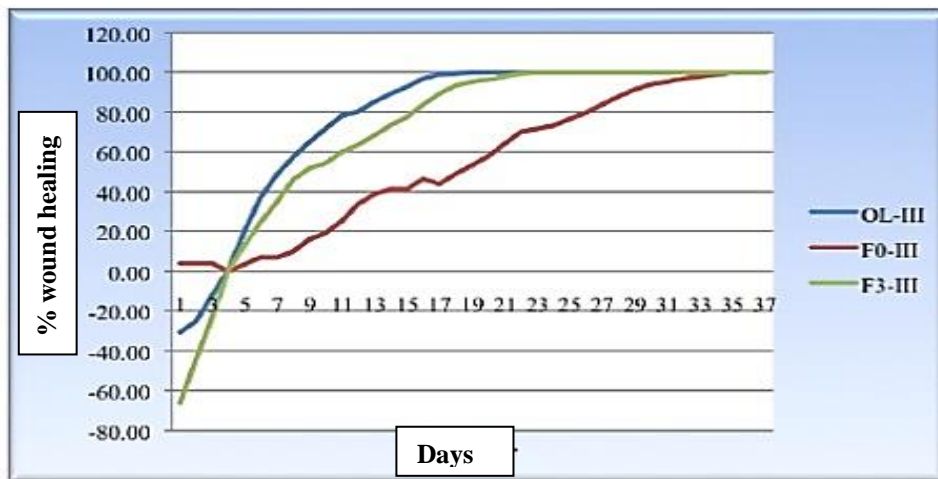
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Graph 1: Measurement result of sterile gel and its effectiveness from group 1 of animal test.



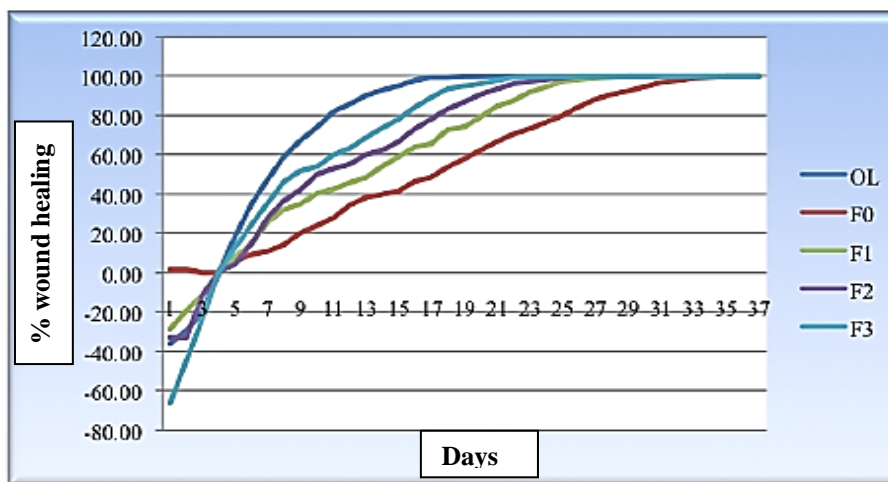
Graph 2: Measurement result of sterile gel and its effectiveness from group 2 of animal test.



Graph 3: Measurement result of sterile gel and its effectiveness from group 3 of animal test.

propolis extract content), 2nd location was smeared with gel OL (external used drug) which has been circulating in the market: Bioplacenton®, 3rd location was smeared with gel F1, F2 and F3 (gel containing extracts of propolis 2.5

%, 5 % and 10 %). Observations and measurements for healing burns required maximum 37 days to completely recover.



Graph 4: Overall effectiveness graphic measurement of each sterile gel formulation.

Table 1: Design formulation and preparation of gel for wound burns by using extract Propolis *Trigona spp.*

Material	F0 (%)	F1 (%)	F2 (%)	F3 (%)
Propolis extract	-	2,5	5	10
HPC	2	2	2	2
Glycerin	3	3	3	3
Propylene glycol	10	10	10	10
Tween 80	0,5	0,5	0,5	0,5
Methyl paraben	0,2	0,2	0,2	0,2
Alcohol	10	10	10	10
Aquabidest add	100	100	100	100

Description:

F0 = gel without extract propolis *Trigona spp.*

F1 = gel containing 2.5 % extracts of propolis *Trigona spp.*

F2 = gel containing 5 % extracts of propolis *Trigona spp.*

F3 = gel containing 10 % extracts of propolis *Trigona spp.*

Table 2: Percentage of average healing result.

Group	OL	F0	F1	F2	F3
I	77.77	56.93	63.34	-	-
II	76.70	54.63	-	67.11	-
III	76.97	53.42	-	-	69.86

Description:

F0 = gel without extract propolis *Trigona spp.*

F1 = gel containing 2.5 % extracts of propolis *Trigona spp.*

F2 = gel containing 5 % extracts of propolis *Trigona spp.*

F3 = gel containing 10 % extracts of propolis *Trigona spp.*

OL= gel sold at markets (Bioplacenton®)

Percentage calculation of healing is done with the following formula:

$$px = \frac{d0-2 - dx2}{d02} \times 100 \%$$

Description:

px = Percentage of wound healing from day to x

d0 = diameter wound to zero days (days when injured)

dx = diameter wound to the day to x

Data analysis was performed using ANOVA statistical calculations with Randomized Complete Block Design.

This design were used with the percentage of healing as a factor observed, formula as treatment and day as a block.

Healing percentage was observed from day 0 to 37 days.

Futher tests were conducted to see the formulas that shows different effects which was Newman Keulls test and the entire data processing assisted with SPSS 15.0 and Microsoft Excel.

RESULTS AND DISCUSSION

The effectiveness testing of gel for wound burn have seen from the percentage of healing to completely recover. The average percentage of healing have been tried out from three groups a rabbit was presented in Graph 1-3. The observation on wound healing in rabbits can be seen in Figure 1-5. Based on Graph 1-3 and Figure 1-5, can be seen that the formulation with fastest in healing of wound burns were OL and F0 as control negative and the longest cure rate followed rate by F1 and F2. For formulation F3, the effectiveness of the healing was almost reached at OL. From the three group, the overall effectiveness of wound burn gel by trial for each formulation was having different healing level. The average percentage of healing for each formulation can be seen in Table 2.

Observation and measurement were required from maximum 37 days to completely recover for healing the wound burns. From the calculation results that the average highest healing was with OL formulation which is external use drug that has been circulating in the market: Bioplacenton® with the average percentage of fastest healing. Next was with formulation F3 (gel containing extracts of propolis 10 %), then F2 (gel containing propolis extract 5 %), and F1 (gel containing extracts of propolis 2.5 %). The results of measuring the effectiveness of each sterile gel formulation as an overall has been presented in Figure 6.



Figure 1: The observation on wound healing in rabbits with F0 gel.



Figure 2: The observation on wound healing in rabbits with F1 gel.



Figure 3: The observation on wound healing in rabbits with F2 gel.



Figure 4: The observation on wound healing in rabbits with F3 gel.

The significance of differences from the formulation made on the effectiveness of sterile gel have been obtained by using Randomized Complete Block Design. The results from data processing was found that the differences in formulation gives a noticeable effect on the effectiveness

of the gel for wound burns. After undergone a further Newman Keulls test with 5 % significant level, have found that formulation F3 has the same healing effectiveness with F2, but in contrast with F1. The best formulation can be used was formulation which near to approached positive



Day of 1st

Day of 15th

Day of 25th

Figure 5: The observation on wound healing in rabbits with Bioplacenton® gel.

control OL (Bioplacenton®). From the 4 formulations, the best formulations were F3 and F2 because it has approached OL effectiveness.

CONCLUSION

Preparation of sterile gel which containing 10 % extract Propolis *Trigona* spp (F3) has a effectiveness of healing wound burns of 69.86 % compared to negative control with 53.42 %.

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CONFLICTS OF INTEREST

All writer stated that there is no potential conflict of interest by research authorial (authorship) or/and publication of this article.

REFERENCES

1. Kuropatnicki AK, Szliszka E, Krol W. Historical aspects of propolis research in modern times. *Evid Based Complement Alternat Med.* 2013; 964149.
2. De Vecchi E, Drago L. [Propolis' antimicrobial activity: what's new?]. *Infez Med.* 2007;15(1):7-15.
3. Seidel V, Peyfoon E, Watson DG, Fearnley J. Comparative study of the antibacterial activity of propolis from different geographical and climatic zones. *Phytother Res.* 2008; 22(9):1256-63.
4. de Groot AC. Propolis: a review of properties, applications, chemical composition, contact allergy, and other adverse effects. *Dermatitis.* 2013;24(6):263-82.
5. Watanabe MA, Amarante MK, Conti BJ, Sforcin JM. Cytotoxic constituents of propolis inducing anticancer effects: a review. *J Pharm Pharmacol.* 2011;63(11):1378-86.
6. Silici S, Kutluca S. Chemical composition and antibacterial activity of propolis collected by three different races of honeybees in the same region. *J Ethnopharmacol.* 2005; 99(1):69-73.
7. Pessolatto AG, Martins DS, Ambrocio CE, et al. Propolis and amnion reepithelialise second-degree burns in rats. *Burns.* 2011;37:1192-1201.
8. Erizal. The influence of pads hydrogel polivinilpirrolidon copolymer (PVP)-κ-carrageenan and healing time of irradiation results in reduction of the diameter of the burns Wistar white rats. *Indo. J. Chem.* 2008;8(2):271-8.