

1-1-2013

DEVELOPMENT OF HAIR CONDITONER COMPRISING A MIXED EXTRACT FROM FRUITS OF PHYLLANTHUS EMBLICA AND ZANTHOXYLUM LIMONELLA

Buppachart Potduang

Itsara Keeta

Wanlapha Saisin

Suchipha Wannaphatchaiyong

Bundit Fungsin

Follow this and additional works at: <https://digital.car.chula.ac.th/tjps>

 Part of the [Pharmacology Commons](#)

Recommended Citation

Potduang, Buppachart; Keeta, Itsara; Saisin, Wanlapha; Wannaphatchaiyong, Suchipha; and Fungsin, Bundit (2013) "DEVELOPMENT OF HAIR CONDITONER COMPRISING A MIXED EXTRACT FROM FRUITS OF PHYLLANTHUS EMBLICA AND ZANTHOXYLUM LIMONELLA," *The Thai Journal of Pharmaceutical Sciences*: Vol. 38: Iss. 0, Article 57.

Available at: <https://digital.car.chula.ac.th/tjps/vol38/iss0/57>

This Article is brought to you for free and open access by the Chulalongkorn Journal Online (CUJO) at Chula Digital Collections. It has been accepted for inclusion in The Thai Journal of Pharmaceutical Sciences by an authorized editor of Chula Digital Collections. For more information, please contact ChulaDC@car.chula.ac.th.

DEVELOPMENT OF HAIR CONDITIONER COMPRISING A MIXED EXTRACT FROM FRUITS OF *PHYLLANTHUS EMBLICA* AND *ZANTHOXYLUM LIMONELLA*

Buppachart Potduang^{1,*}, Itsara Keeta¹, Wanlapha Saisin², Suchipha Wannaphatchaiyong² and Bundit Fungsin³

¹Pharmaceutical and Natural Products Department, Thailand Institute of Scientific and Technological Research (TISTR), Technopolis, Klong 5, Klong Luang, Pathumthani, 12120, Thailand; E-mail: buppachart@tistr.or.th

²Department of Pharmaceutical Sciences, Prince of Songkla University, Hatyai, Songkhla, 90110, Thailand.

³Biosciences Department, Thailand Institute of Scientific and Technological Research (TISTR), Technopolis, Klong 5, Klong Luang, Pathumthani, 12120, Thailand.

KEYWORDS: Hair conditioner, *Phyllanthus emblica*, *Zanthoxylum limonella*, Anti-inflammation, Antioxidation

INTRODUCTION

Hair conditioner is a hair care product that is applied after shampooing in order to condition the hair and then rinsed out. The product is beneficial to dry or damaged hair. It works by restoring moisture, and smoothing the cuticles of the hair follicles¹. Ultraviolet and visible radiations are known to damage hair involving hair color changes and protein damage. It can cause permanent damage to the cuticle, which is the outside covering of the hair. It can penetrate into the cortex, which is the center of the hair, and do all sorts of damage. UV breaks chemical bonds and cause dryness, rough texture, split ends, susceptibility to breakage, unmanageability, and loss of pigmentation and luster².

This research aimed to develop an anti-microbial, antioxidant and anti-inflammatory benefits hair conditioner for damaged hair and nourish the scalp, comprising a patented mixed extract from fruits of *Phyllanthus emblica* and *Zanthoxylum limonella*. The extract's antioxidant effect will help reducing hair damage from free radicals causing by pollutants and UV rays. Hair and scalp health could be promoted by the anti-microbial and anti-inflammatory effects of the extract.

Phyllanthus emblica L. (EUPHORBIACEAE), or Ma-khampom, is an herbal plant commonly found in Thailand. The edible fruit was reported as an alternative treatment of skin disorders, inflammations and premature graying. Chemical constituents of the fruit include vitamin C, gibberellins, lupeol, kaempferol, quercetin, emblicain A and B, punigluconin, pedunculagin, phyllanthin, zeatin, amlaic acid, corilagin ellagic acid, putranjivain A, digalic acid, phyllembolic acid, emblicol and galactaric acid³. The fruit also has antioxidant activity, which provides protection against free radicals induced by UV⁴. We have found that the ethanol fruit extract of *P.emblica* was effective as an anti-microbial (MIC 10-20 mg/ml) and anti-oxidant (EC₅₀ 18.7 µg/ml).

Zanthoxylum limonella Alston (RUTACEAE), or Ma-khwaen, is widely distributed in the northern part of Thailand. Dry fruits are sold in local markets and traditionally used as spice. Its essential oil exhibits the anti-oxidative potential. The oil contains Sabinene which is a potent bactericidal against the multi-drug resistant bacteria⁵⁻⁷. We have reported that the ethanol fruit extract of *Z. limonella* is effective against tested microbial including *C. albicans* (MIC 2.5-10 mg/ml) and is an anti-oxidant (EC₅₀ 5.9 µg/ml) with total flavonoids of 3.61 mg rutin/g extract⁸.

The patented mixed extract from fruits of *P. emblica* and *Z. limonella* is effective as an anti-oxidant (EC₅₀ 7.9 µg/ml) and *in vitro* anti-microbial (MIC 4.5 mg/ml) against *Propionibacterium acne*, *Staphylococcus aureus*, *S. epidermidis* and *Streptococcus pyogenes*⁹. The mixed extract was used to develop a patented hair conditioner for antioxidant benefits and to nourish the hair and scalp.

MATERIALS AND METHODS

Plant material The dry fruits powder of *P. emblica* and *Z. limonella* were provided by the Sakaerat Biosphere Research Center, Agricultural Technology Department, Thailand Institute of Scientific and Technological Research (TISTR).

Preparation of the mixed extract The water-ethanol crude extracts from dry fruits of *P. emblica* and *Z. limonella* were mixed in a patented proportion for the best anti-microbial activity.

Formulation of hair conditioner Hair conditioners consisting of the *P. emblica* and *Z. limonella* mixed extract were formulated in 3 formulas. They were varied in amount of ingredients in the basic formula as shown in Table 1. The cream was prepared in two phases: Phase A comprising mineral oil, emollients, emulsifiers and thickening agents were heated at 75-80 °C. Phase B comprising water and humectants were heated at 75-80 °C. Phase B was added into phase A and homogenized to make cream base. A water solution of the mix extract, a solubilizer, cationic surfactant, conditioning agent and preservative was

added into the cream base while stirring, and then added perfume and stirred homogeneously with a homogenizer. Adjust the pH range 5.0 to 8.5 with NaOH solution (5%). RP-HPLC was used for quality control of the product.

Table 1 The basic formula of hair conditioner.

Ingredients	Function	%w/w
Polyquaternium-7	Cationic surfactant	1-5
Cetyl alcohol	Thickener	X
Stearyl alcohol	Thickener	X
Mineral oil	Emollient	1-5
Beeswax	Thickener	1-5
Polyquaternium-11	Conditioning agent	1-5
A	Emulsifier	1-5
Span 80	Emulsifier	1-3
Propylene glycol	Humectants	1-5
Preservative	Preservative	0.1-1
Active mix extract	Active ingredient	A
NaOH solution (5%)	Basifying agent	q.s.
Fragrance	Odoring agent	q.s.
Water	Solubilizer	q.s. to 100

Stability test Stability of the hair conditioner in accelerated conditions was assessed using heating and cooling method which defined as cycling between storage conditions of 4 °C for 24 hrs and 45 °C 24 hrs for 6 cycles. The physical stability of samples was evaluated on turbidity, precipitation and appearances.

RESULTS AND DISCUSSION

A hair conditioner for antioxidant benefits was formulated in 3 formulas comprising a mixed extract from fruits of *P. emblica* and *Z. limonella*. Thickener and emulsifier was varied in Formula 1, 2 and found that Formula 1 was more viscous and gave homogenous cream base than Formula 2. So Formula 1 was chosen for cream base in Formula 3 in which a water solution of the mixed extract was added. Formula 3 was stable and not separate under centrifugation and stability testing.

CONCLUSION

The patented mixed extract from fruits of *P. emblica* and *Z. limonella* could be used as an active extract for hair conditioner products. The best formula of hair conditioner is Formula 3 which was stable under 6 cycles of heating and cooling test. It gave soft-after feeling and moisturizing effect after used. The product will act as a shield for harmful UV rays and protect the hair from environmental pollution as well as benefits from the anti-microbial and anti-inflammatory effects of the mixed extract.

ACKNOWLEDGMENTS

This study was supported by the Pharmaceutical and Natural Products Department, Thailand Institute of Scientific and Technological Research (TISTR). We thank all TISTR colleagues who in one way or another help this project to succeed.

REFERENCES

1. What is Hair Conditioner? Available at <http://www.wisegeek.com/what-is-hair-conditioner.htm>, accessed December 3, 2012.
2. Beauty care. 2000. Sunlight and hot blow-drying are major causes of hair damage. Available at <http://www.beautycare.com/newspro/talk/053053590,28049.html>, accessed December 3, 2012.
3. *Phyllanthus emblica* L. Available at http://www.globinmed.com/index.php?option=com_content&view=article&id=79255:phyllanthus-emblica-l&catid=718:p&Itemid=150, accessed December 2, 2012.

4. Penning A. 2012. Beauty in layers: Multitasking ingredients. GCI Magazine (June). Available at <http://www.gcimagazine.com/marketstrends/segments/antiaging/156350405.html?page=3>, accessed December 2, 2012.
5. Mallikarjuna P, Maheswara U, Rao V and Satyanarayana T. 1999. Antimicrobial activity of *Zanthoxylum limonella*. Indian Drugs 36 (7): 476-478.
6. Tangjitjaroenkun J, Supabphol R and Chavasiri W. 2012. Antioxidant effect of *Zanthoxylum limonella* Alston. J Med Plants Res 6(8): 1407-1414.
7. Charoenying P, Laosinwattana C, Phuwiwat W, and Lomratsiri J. 2008. Biological activities of *Zanthoxylum limonella* Alston fruit extracts. KMITL Sci J 8(1): 12-15.
8. Ngamon Y, Potduang B, Fungsin B, Phasuk S, Takolpuckdee P, Rerk-am U, Kaewduang M and Tanpanich S. 2012. Antimicrobial, antioxidant activities and total flavonoids of fruit extracts from Ma-Khwaen (*Zanthoxylum limonella*). Thai J Pharm Sci 35 (January, Suppl.): 36-37.
9. Potduang B, Fungsin B, Keeta I, Ketmanee N, Intharungsri A, Soradech S, Niwaspragrit C and Tanpanich S. 2012. Biological activities of a patented mix extract from fruits of *Phyllanthus emblica* and *Zanthoxylum limonella*. Thai J Pharm Sci 36 (suppl): 44-47.