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THE DEVELOPMENT OF MOISTURIZING SPRAY-ON COMPRISING A MIX EXTRACT FROM FRUITS OF *P. EMBLICA* AND *Z. LIMONELLA*

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KEYWORDS: Moisturizing spray, *Phyllanthus emblica*, *Zanthoxylum limonella*, anti-inflammation, anti-microbial

INTRODUCTION

Moisturizing spray-on is highly hydrating spray for moisturizing and nourishing skin to prevent and refresh dry and itching skin. Skin itching occurs from various causes such as dry skin, infections, irritants, allergies, dermatitis, medication and substance abuse, excessive sweating and other health conditions. The moistened skin reduces the urge to scratch that worsen the symptoms as the disruption of skin is susceptible to bacterial infection¹.

This research aimed to develop a spray-on moisturizer for dry itchy skin comprising a patented mix extract from fruits of *Phyllanthus emblica* and *Zanthoxylum limonella* which are anti-microbial, anti-inflammatory, antioxidant and anti-tyrosinase effective.

Phyllanthus emblica L. (EUPHORBIACEAE) is known as Ma-khampom. It is an herbal plant commonly used in Asian traditional medicine. Its fresh or dry fruits were reported to be used as an alternative treatment of diarrhea, jaundice, skin disorders, inflammations and premature graying. The fruit extract is used as a skin-lightening agent, benefits from its anti-tyrosinase effect. Its antioxidant activity provides protection against free radicals induced by UV. Phenolic compounds from *P. emblica* exhibited anti-inflammatory effect^{2, 3, 4, 5, 6}.

Zanthoxylum limonella Alston (RUTACEAE) is known as Ma-khwaen. It has been extensively used in folk medicines for different medical purposes. The fruit has been traditionally used as food flavor in the northern part of Thailand. The essential oil from *Z. limonella* fruits exhibits the anti-oxidative potential. The oil contains Sabinene which is a potent bactericidal against the multi-drug resistant bacteria^{7, 8, 9}.

The patented mix fruit extract from fruits of *P. emblica* and *Z. limonella* is effective as *in vitro* anti-microbial (MIC 4.5 mg/ml) against *P. acne*, *S. aureus*, *S. epidermidis* and *S. pyogenes*; anti-oxidant (EC₅₀ 7.9 µg/ml); anti-tyrosinase (IC₅₀ 5.52 mg/ml); potent anti-inflammatory on croton oil-induced rat ear edema better than std. Diclefenac. The mix extract was used to develop a patented moisturizing spray-on for preventing and refreshing dry and itchy skin.

The developed moisturizing spray-on is an easy to carry product to moisten and refresh up skin in a second. The liquid filled bottle is equipped with a product pump spray nozzle, which need no propellant and generate no aerosol. The moisturizing spray-on formula composes of the active ingredients in an appropriate solvent. Humectants are responsible to increase water content of the top layers of skin, and affect the skin moisture contain. A flavoring agent is added for good smell with refresh and relaxes feeling. A chelating agent stabilizes the product not to precipitate. The preservative is essential to prevent product damage caused by microorganisms and to protect the product from inadvertent contamination by the consumer during use. An active mix extracts from fruits of *P. emblica* and *Z. limonella* benefits the product for its antimicrobial, anti-inflammation antioxidant and anti-tyrosinase activities.

MATERIALS AND METHODS

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

Preparation of the mix extract: *P. emblica* extract was prepared by macerated the fruit powder 500 g with ethanol-water for 4 nights, filtered through Whatman paper No.41 and rinse with the same solvent. The the solvent was removed under reduced pressure using a rotary evaporator (Heidolph, Hei-VAP Precision) at 45 °C. *Z. limonella* was extracted with another proportion of ethanol-water for 3 nights, filtered, rinsed and evaporated under reduced pressure. The crude extracts were mixed at appropriate ratio to be effective against tested microbial using agar diffusion assay (not presented).

Formulation of moisturizing spray-on: Moisturizing spray-on consisting of the *P. emblica* and *Z. limonella* mix extract was formulated in 4 formulas. They were varied in amount of ingredients in the basic formula as shown in Table 1. Prepared a mixture of the mix active extract, a humectant with small amount of water; and then added another humectant and a solubilizer. The chelating agent solution in water was added to the previous mixture, added purified water and mixed thoroughly. The preservative and fragrance were then added while stirring. RP-HPLC was used for quality control of the product.

Table 1 The basic formula of moisturizing spray-on.

Ingredients	%w/w
Solubilizer, humectants	a
Humectant	b
Hemectant	c
Preservative	d
Chelating agent	e
Flavoring agent	f
Fragrance	g
Active mix extract	h
Water	q.s.100

Stability test: The formulated moisturizing spray-on was tested under heating and cooling test, at 4 °C 24 hrs and 45 °C, 24 hrs for 6 cycles. The physical stability of samples was evaluated on turbidity, precipitation and appearance.

In vitro anti-microbial assessment of the product: A paper disk agar diffusion assay was performed against *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus pyogenes*, *Propionibacterium acnes*, and *Candida albicans*. Stock of microorganism was prepared by cultivation on agar, when microorganism reveals good, it was separated to sterile water and adjusted to the concentration of 0.5 McFarland. Twenty milliliters of nutrient agar was added and allowed to set in a petri dish. After that the microorganism was added and distributed evenly over the agar surface. When surface dry, filter paper disks were placed and 20 µl of sample was added onto the disk. Incubated at 37 °C for 18-24 hrs, then observed the clear zone of inhibition.

RESULTS AND DISCUSSION

The moisturizing spray-on containing the patented mix extract from fruits of *P. emblica* and *Z. limonella* was formulated in 4 formulas. Formula 1 gave clear yellow solution, but it became turbid after 2 cycles of the stability test. More chelating agent and solubilizer was added in formula 2 to give clear yellow solution which was stable at accelerated conditions of the stability testing (heating-cooling method at 45° C 24 hrs and 4° C 24 hrs for 6 cycles). Formula 3 and 4 were derived from formula 2 by adding different amount of a flavoring agent to the mixture of humectant, solubilizer and the active extract, and mixed well before adding the chelating agent solution. Formula 4 was selected for its acceptable leave-on feeling and its anti-microbial effective. The product gave moisturized and refreshed skin feeling. The *in vitro* anti-microbial assessment is on going. A preliminary anti-microbial assay of the product exhibited that it was active against tested microbial, including *C. albicans* (not presented).

CONCLUSION

The patented mix extract from fruits of *P. emblica* and *Z. limonella* could be used as an active extract for moisturizing spray-on product. The best product was formula 4 comprising appropriate amount of flavor, chelating agent and solubilizer to give stable clear yellow solution, which can moisten and refresh up skin quickly. The product benefits from the anti-inflammatory, anti-microbial, antioxidant and anti-tyrosinase effects of the active mix extract.

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