

The Ultimate Skin and Mind Revival: a Comparative Analysis of Glutathione, BOTOX, and Resorcinol's Anti-Aging and Anti-Anxiety Effects

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ABSTRACT

This comparative study examines the effectiveness of BOTOX, Glutathione, and Resorcinol in addressing various dermatological conditions. BOTOX was found to reduce anxiety and oxidative stress in ageing mice, suggesting its potential in treating anxiety-related disorders. Glutathione demonstrated skin-lightening effects at doses as low as 500mg/day, making it a viable option for hyperpigmentation treatment. However, Resorcinol emerged as the most versatile and effective treatment, inhibiting tyrosinase, precipitating cutaneous proteins, and exerting antibacterial and anti-inflammatory effects. These findings suggest Resorcinol as a valuable treatment option for hyperpigmentation, acne, and inflammation, warranting further research and dermatological applications.

Keywords: Resorcinol, Glutathione, BOTOX, dermatology, skinlightening, hyperpigmentation, acne, inflammation.



OBJECTIVE

The combined objective of using Resorcinol, Glutathione, and Botox is to achieve a

more radiant, even skin tone. Resorcinol helps to inhibit melanin production and promotes exfoliation, reducing pigmentation and dark spots. Glutathione acts as a powerful antioxidant, reducing oxidative stress and further preventing melanin synthesis for a brighter complexion. Botox works by smoothing fine lines and wrinkles, improving skin texture and tone for a more youthful appearance. Together, these ingredients target multiple aspects of skin health, delivering a smoother, brighter, and rejuvenated

BOTOX® introduction

Anxiety is a psychological trait that affects individuals worldwide, hindering productivity and quality of life. Its underlying mechanisms are unclear, but ageing and abnormal neurotransmitter discharge are contributing factors. Acetylcholine (ACh) is a key neurotransmitter involved in various physiological functions and neuroplasticity. Altered ACh levels have been linked to cognitive impairments, emotional disorders, and anxiety. Recent evidence suggests that individuals with anxiety have increased ACh levels, making targeting abnormal ACh release a potential therapeutic approach for anxiety disorder.

Resorcinol introduction

Melanin is the primary pigment responsible for skin, eye, and hair color. It is known to produce whitening effect on the skin due to its ability to inhibit MELANIN production. Melanin is the pigment responsible for skin colour, excessive melanin production can lead to Hyperpigmentation. It works by inhibiting the enzyme Tyrosinase. It has exfoliating properties. It has photoprotective functions, but deficiencies or excess can lead to dermatological issues like albinism, melasma.

Phenylethyl resorcinol (PR) is a tyrosinase inhibitor with antioxidant benefits, showing potential for

treating hyperpigmentation and related skin disorders.

Glutathione introduction

Glutathione primarily acts in MELANOCYTES the cell in the skin responsible for producing melanin. It also inhibits the activity of the enzyme Tyrosinase which is crucial for melanin synthesis. While some seek to tan, others aim to lighten their skin. Glutathione, a systemic agent and antioxidant, has gained popularity for its skin-lightening effects. It regulates the melanogenic pathway and has detoxifying properties, making it a widely used dietary supplement.

Glutathione method

Sixty healthy female volunteers, aged 20-50 years, were recruited from the dermatology clinic at King Chulalongkorn Memorial Hospital in Bangkok. Volunteers underwent thorough medical screening, including medical history, physical examination, and laboratory tests (serology, hematology, and biochemistry) to confirm their health. Participants were required to abstain from other medications, supplementary vitamins, and alcohol intake for 2 weeks prior to enrollment and throughout the study. Informed consent was obtained from each volunteer before screening, and participants had the right to withdraw their consent at any time

Botox method

Estimation of Antioxidant Enzymatic Activities in Hippocampus

1. Protein extraction: Homogenized hippocampus tissues with RIPA buffer and protease inhibitors.
2. SOD activity: Measured by pyrogallol autoxidation inhibition at 440 nm.
3. Catalase activity: Estimated by chromic acetate production at 570 nm.
4. GSH measurement: Assayed by reaction with DTNB at 412 nm.
5. GPx activity: Assayed using H₂O₂-mediated oxidation of glutathione.

Resorcinol method

Inclusion and Exclusion Criteria

Inclusion criteria:

Female subjects aged 18-50 years

Presence of epidermal melasma confirmed by Wood's light lamp examination and dermoscopy

Modified Melasma Area Severity Index (mMASI) score ≥ 8

Exclusion criteria:

Pregnancy or lactation

History of allergic reactions to study medication

Use of depigmenting agents or corticosteroids within 6 weeks of study initiation
Study Medication
4-n-butylresorcinol cream (concentration not specified)

Applied topically to affected areas twice daily for 8 weeks

Efficacy Assessments

-Modified Melasma Area Severity Index (mMASI) score at baseline, week 4, and week 8

Digital photographs taken at each visit for evaluation

Safety and Tolerability Assessments

Adverse events reported by patients and evaluated by investigators

Tolerability assessed using a 4-point scale:

Excellent: no adverse events

Good: mild adverse events that subsided with or without medication

Fair: moderate-to-severe adverse events that subsided with or without medication

Poor: severe or serious adverse events that necessitated stoppage of study medication

Characterization and Analysis of PR.

PR was characterized using Differential Scanning Calorimetry (DSC) Thermogravimetric Analysis (TGA) Nuclear Magnetic Resonance (NMR) A new HPLC method was developed and validated to analyze PR. Additional properties determined. LogP value, Solubility, Short-term stability, Permeation profiles in porcine and human skin. Evaporation of selected vehicles using Dynamic Vapour Sorption (DVS)

Glutathione

Glutathione's Mechanism of Action

Tyrosinase inhibition: Glutathione inhibits tyrosinase activity, preventing melanin formation.

Oxidation and inactivation: Glutathione can be oxidized and Mechanism of Melanin Production and Hyperpigmentation

Melanin production: Tyrosinase converts L-tyrosine into melanin through the Raper-Mason pathway.

Hyperpigmentation: Exposure to UV radiation increases tyrosinase activity, leading to excessive melanin production and hyper pigmentation.

Inhibition of Tyrosinase: Glutathione inhibits the activity of tyrosinase, the enzyme responsible for converting tyrosine into melanin.

Reduction of Melanin Production: By inhibiting tyrosinase, Glutathione reduces the production of melanin, leading to a decrease in skin pigmentation.

Antioxidant Effects: Glutathione's antioxidant properties help protect the skin from oxidative stress and damage caused by free radicals.

Regulation of Melanogenic Genes: Glutathione may also regulate the expression of melanogenic genes, reducing the production of melanin and skin pigmentation.

Inhibition of Melanosomal Transfer: Glutathione may inhibit the transfer of melanosomes (melanin-containing organelles) to surrounding skin cells, reducing skin pigmentation.

Glutathione regulates cysteine levels: Glutathione in the liver regulates the levels of cysteine, an amino acid involved in melanin production. Reduced cysteine levels lead to decreased melanin production, resulting in lighter skin.

BOTOX®

Mechanism of Action of Botulinum Toxin:

Botulinum toxin is a potent neurotoxin that temporarily relaxes muscles by:

1. Inhibiting the release of acetylcholine at the neuromuscular junction
2. Cleaving the SNAP-25 protein, which blocks vesicle fusion and release
3. Preventing muscle contraction, resulting in localized relaxation

This leads to:

Smoothing of overlying skin

Reduction of wrinkles

Temporary improvement in facial appearance. Effects are reversible, as SNAP-25 regenerates over time, restoring normal neuromuscular signaling and muscle contractility.

Resorcinol

Resorcinol's Mechanism of Action:

Resorcinol's effective in treating various dermatological conditions stems from its ability to precipitate cutaneous proteins. Resorcinol binds to and precipitates proteins in the skin, leading to Antibacterial effects which Reduces bacterial growth and infection also its has Keratolytic effects which Breaks down keratin, and a protein that can clog pores. Resorcinol may also reduce

inflammation, which can contribute to various skin conditions known as Erythema. Exert anti-inflammatory effects and Other skin conditions characterized by bacterial infection, inflammation, or keratin buildup.

Inhibiting Tyrosinase: Resorcinol binds to the active site of tyrosinase, an enzyme responsible for converting the amino acid tyrosine into melanin.

Reducing Melanin Production: By inhibiting tyrosinase, Resorcinol reduces the production of melanin, resulting in a decrease in skin pigmentation.

Antioxidant Effects: Resorcinol also has antioxidant properties, which help protect the skin from oxidative stress and damage caused by free radicals.

The skin whitening effects of Resorcinol

1. **Reduced Melanin:** Resorcinol's inhibition of tyrosinase leads to a decrease in melanin production, resulting in lighter skin.
2. **Improved Skin Tone:** Resorcinol's antioxidant effects help improve skin tone and reduce the appearance of hyperpigmentation.
3. **Enhanced Skin Brightness:** Resorcinol's skin whitening effects can also enhance skin brightness, giving the skin a more radiant appearance.

RESULT AND DISCUSSION

The BOTOX study aimed to investigate the anxiolytic effects of BOTOX injection in ageing mice and explore its potential as a neuroprotective agent. The results showed that BOTOX-treated animals exhibited reduced anxiety-like behaviors in the open field test, elevated plus maze, and light-dark box. Biochemical analysis revealed increased antioxidant enzyme activities in the hippocampus of BOTOX-treated animals. These findings suggest that BOTOX reduces innate anxiety in ageing mice by increasing antioxidant enzyme activities.

The Glutathione study evaluated the efficacy and safety of oral glutathione supplementation in reducing melanin indices and improving skin elasticity and wrinkles in healthy females. The results showed that 57 volunteers completed the study, with most subjects having skin phototype IV. Baseline measurements showed no significant differences between GSSG, GSH, and placebo groups. Efficacy analysis revealed changes in efficacy over time for GSSG, GSH, and placebo.

The Resorcinol study examined the physicochemical properties, analytical method validation, solubility, stability, and permeation

studies of Resorcinol. The results showed that Resorcinol had a melting point of 79.13 °C and a logP of 3.35 ± 0.03. Analytical method validation revealed linearity, accuracy, and precision. Solubility and stability studies confirmed Resorcinol's stability in various solvents. Permeation studies showed that Resorcinol penetrated porcine and human skin.

Resorcinol's skin-whitening effects were also investigated. The results showed that Resorcinol significantly reduced melanin production, improved skin brightness, and promoted exfoliation. Its antioxidant properties protected the skin from oxidative stress and damage. The study suggests that Resorcinol may be a useful ingredient in skin-whitening products.

Resorcinol is a phenolic compound with antioxidant, anti-inflammatory, and skin-lightening properties. It is commonly used to treat hyperpigmentation, acne, and other skin conditions. However, it is essential to use Resorcinol in moderation and under medical supervision, as it can cause skin irritation and other adverse effects in some individuals

CONCLUSION

Compare all three drugs have their advantages, Resorcinol stands out as a versatile and effective treatment for various dermatological conditions, including hyperpigmentation, acne, and inflammation. Its ability to inhibit tyrosinase, precipitate cutaneous proteins, and exert antibacterial and anti-inflammatory effects make it a valuable treatment option. However, it is essential to consult a dermatologist before using any of these drugs, as they may have varying degrees of

effectiveness and potential side effects depending on individual skin types and conditions.

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