

## Original Article

# Dermal Detoxification Using Lycopene-Rich Tomato Extract and Magnesium Sulphate Scrub: A Comparative pilot study

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### ABSTRACT

**Background:** Skin detoxification enhances clarity, circulation, and reduces inflammation. Natural agents like tomato extract and Epsom salt are traditionally used for such purposes. Tomato is rich in lycopene and vitamin C, known for their antioxidant and anti-inflammatory properties. Epsom salt (magnesium sulfate) is widely used for exfoliation and relief of inflammation. **Objective:** To compare the immediate effects of topical application of tomato extract and Epsom salt scrub massage on skin health and detoxification in healthy individuals. **Methods:** A two-week pilot study was conducted on 20 healthy participants aged 18–23 years, randomly assigned to two groups. Group A applied tomato pulp and Group B used an Epsom salt mixed with coconut oil. And both treatments applied for 20 minutes daily. Skin clarity and texture were assessed pre- and post-intervention using a standardized 10-point dermatological rating scale. Paired and independent t-tests were used for statistical analysis. **Results:** Both groups showed significant improvement in skin clarity and texture ( $p < 0.001$ ). The tomato group showed a mean improvement of 3.2 points (from 5.2 to 8.4), while the Epsom salt group improved by 2.7 points (from 5.1 to 7.8). No adverse effects were reported. The tomato group showed slightly better results in subjective parameters such as glow and smoothness. **Conclusion:** Tomato extract is effective in enhancing skin detoxification and improving appearance, comparable to Epsom salt. Lycopene's antioxidant action offers added benefits. Tomato may serve as a natural, accessible alternative in topical detox routines. Larger studies are recommended to further validate these findings.

**Key words:** Lycopene, Skin detoxification, Tomato extract, Epsom salt scrub, Phytochemical

The skin is not only the largest organ of the human body but also serves as a vital detoxification interface, actively involved in the elimination of metabolic waste and the maintenance of overall health (1). External factors such as pollution, UV exposure, poor diet and stress contribute to the accumulation of toxins, resulting in dull, inflamed, or problematic skin (2). In recent years, there has been an increasing shift toward natural, plant-based and non-invasive methods to promote skin detoxification and rejuvenation (3).

Tomato (*Solanum lycopersicum*), widely consumed for its nutritional value, contains several potent phytochemicals, including lycopene, beta-carotene, phytoene, flavonoids and vitamin C. Among these, lycopene—a red carotenoid pigment—has received considerable attention for its strong antioxidant properties (4). It neutralizes free radicals, reduces oxidative stress and penetrates deep into the skin layers to support dermal health (5). Lycopene has also been shown to

have anti-inflammatory effects, thereby helping reduce redness, blemishes and uneven skin tone (6).

On the other hand, Epsom salt, chemically known as magnesium sulphate, has been traditionally used in hydrotherapy and balneotherapy to treat muscular aches, skin inflammation and acne (7). When used as a scrub, Epsom salt not only offers mechanical exfoliation but also provides essential magnesium that is absorbed through the skin and may aid in reducing inflammation and stimulating detoxification (8).

Despite the individual benefits of both tomato and Epsom salt, comparative studies evaluating their efficacy as topical agents in skin detoxification are lacking. Hence, this pilot study aims to compare the immediate effects of tomato extract and Epsom salt scrub massage on skin health in healthy individuals and to explore the potential of lycopene as a natural alternative for skin detoxification.

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MATERIALS AND METHODS

Twenty healthy undergraduate students without any dermatological issues, aged 18–23 years were enrolled for this two-week pilot study. Exclusion criteria included use of antioxidant supplements or topical medications within three months prior to study initiation as well as the presence of open wounds on the hand. Selected participants were randomly divided into two groups with 10 members in each group:

- **Group A (Tomato Scrub):** Participants were given massage on their forearm with freshly extracted tomato pulp for about 20 minutes daily.
- **Group B (Epsom Salt Scrub):** Participants were given massage on their forearm with epsom salt and coconut oil mixture for about 20 minutes daily.

A dermatological scale (10-point rating) assessed pre- and post-intervention skin clarity, glow and texture by blinded observers. Data were checked for normal distribution using Kolmogorov-Smirnov test and Shapiro-Wilk test. As the data were normally distributed, Paired t-test was used to assess within-group changes, and independent t-test for compared between-the two groups difference.

RESULTS

All 20 participants completed the study without any averse effects. Baseline skin health scores were similar in both groups, with the tomato scrub group starting at a mean score of 5.2 and the Epsom salt group at 5.1 on the 10-point dermatological scale.

After two weeks of intervention:

- The tomato scrub group showed a mean improvement of 3.2 points, reaching an average post-intervention score of 8.4. Participants in this group reported noticeable improvements in skin smoothness, clarity and reduced redness or blemishes. Observers noted a visible glow and evenness in skin tone.
- The Epsom salt group also demonstrated a mean increase of 2.7 points, with the post-intervention average at 7.8. Improvements in exfoliation, reduction in blackheads, and mild soothing of inflamed areas were reported. Participants felt their skin was “lighter” and “cleaner.”

Statistical analysis using paired t-tests revealed that both groups showed significant within-group improvements ( $p < 0.001$ ). However, when the post-intervention scores were compared between the groups using an independent t-test, there was no statistically significant difference ( $p = 0.28$ ), indicating that both methods were comparably effective.

Table 1: Mean Skin Health Scores Before and After the Intervention

Group	Pre-Intervention Mean $\pm$ SD	Post-Intervention Mean $\pm$ SD	Mean Difference	p-value (paired)	Comparing between groups
Tomato Scrub	5.2 $\pm$ 0.63	8.4 $\pm$ 0.52	3.2	<0.001*	0.28
Epsom Salt Scrub	5.1 $\pm$ 0.61	7.8 $\pm$ 0.49	2.7	<0.001*	

Despite the lack of statistical difference, the tomato group exhibited a slight edge in subjective measures like glow and clarity, likely attributed to the antioxidant effects of lycopene and vitamin C.

DISCUSSION

This pilot study demonstrates that both tomato extract and Epsom salt scrub massage significantly improve skin texture, clarity and overall appearance in healthy individuals. Although both groups showed statistically significant improvements, the tomato group exhibited slightly greater enhancement in skin glow and reduction in inflammation, likely due to its rich phytochemical profile.

Tomato contains high levels of lycopene, a lipophilic carotenoid known for its potent antioxidant activity. It scavenges reactive oxygen species (ROS), protecting skin cells from oxidative damage caused by environmental factors such as UV radiation and pollution (9). Lycopene localizes within the lipid-rich membranes of dermal cells, reducing oxidative stress and maintaining collagen integrity (10). Additionally, lycopene downregulates pro-inflammatory cytokines such as TNF- $\alpha$  and IL-6, which may explain the observed decrease in redness and inflammatory signs (11, 12).

In addition to lycopene, tomatoes are also rich in vitamin C, which enhances collagen synthesis and inhibits melanin production, contributing to skin brightness and even tone (13). The slight acidity of tomato juice may aid in gentle exfoliation and increased skin permeability, that further enhancing the absorption of these active compounds (14).

The massage technique used during the application also stimulated local circulation and lymphatic flow, promoting the removal of metabolic waste and improving skin vitality. Epsom salt, composed of magnesium sulphate, functions primarily through mechanical exfoliation and potential transdermal absorption of magnesium (15). Magnesium supports epidermal barrier repair, reduces inflammation and promotes hydration by maintaining cellular homeostasis (16, 17). The combination with coconut oil may also aid in softening the skin and preventing dryness post-scrub (18). While the Epsom salt group showed comparable improvements, the tomato group showed marginally better results in subjective parameters such as glow and clarity, indicating the added benefit of antioxidant-rich

phytochemicals. These findings align with earlier studies suggesting topical lycopene improves skin resilience and texture.

Despite promising results, this study has limitations. The small sample size, short intervention duration and subjective outcome assessment restrict generalizability. Objective biomarkers such as hydration levels, skin elasticity, or sebum content were not measured. Moreover, long-term effects remain unexplored. Nevertheless, the findings highlight the potential of tomato extract as a natural, safe and cost-effective alternative to conventional exfoliating or detoxifying agents. Its efficacy, coupled with accessibility and ease of use, makes it a suitable candidate for routine skin detox practices in integrative dermatology.

## CONCLUSION

Tomato extract and Epsom salt scrub massage are both effective, natural and low-cost skin detoxification methods. Tomato scrub, with its phytochemical profile, offers added advantages in skin clarity and smoothness followed by antioxidant support. Future studies should focus on long-term effects and include biochemical assessments of detox markers.

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