INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Review Article

Citrus Shield Vitamin C And E Enriched Skin Serum

Harshal Deshmukh*, Rakshada Dhudkekar, Dr. Swati Deshmukh

Shraddha Institute of Pharmacy, Kondala Zambre, Washim-444505.

ARTICLE INFO

Published: 7 Nov 2025
Keywords:
Vit C, Vit E, Benefits, UV Effect of Skin, Serum, Material, Method, Maceration, Evaluation
DOI:
10.5281/zenodo.17551658

ABSTRACT

This analysis has shed important light on the fascinating field of orange peel and its potential use in improving skin health. This study has examined orange peel's nutritional makeup, anti-inflammatory and antioxidant properties, anti-aging potential, UV protection capabilities, and useful uses in addition to emphasizing its value as a natural resource for comprehensive skin care. Orange peel's potential as a preventive agent against oxidative stress and inflammation, two major factors in skin ageing and damage, has been revealed by research into its antioxidant and anti-inflammatory qualities. These effects are regulated by bioactive compounds such as flavonoids and carotenoids, which strongly support their use in skincare routines. Vitamin C acts as a potent antioxidant and skin-brightening agent by neutralizing free radicals and promoting collagen synthesis, while Vitamin E enhances skin hydration and provides photo protective properties.

INTRODUCTION

The cosmetic and pharmaceutical sectors are investigating plant-based compounds with strong bioactive qualities in response to the growing demand for sustainable and natural skincare products. Vitamin C (ascorbic acid) is widely known for its moisturizing, brightening, and antioxidant qualities, which make it a crucial active component of contemporary skincare products.(1)A variety of dermatological advantages are provided by these bioactive substances, such as enhanced skin tone, anti-aging properties, and better hydration. In addition to giving agricultural waste value, using orange peel extract is consistent with green chemistry concepts. Since our systems are unable to effectively make or retain it, vitamin C, sometimes referred to as ascorbic acid, is a water-soluble nutrient that is vital for human health. It also supports immunological response, wound healing, and defence against free radical-induced oxidative stress.Vitamin C from Natural Sources Citrus fruits, green leafy vegetables, tomatoes, potatoes, and other foods high in vitamin C.(2) Orange peel contains several chemicals that contribute to its

***Corresponding Author:** Harshal Deshmukh
Address: *Shraddha Institute of Pharmacy, Kondala Zambre, Washim-444505.*
Email ✉: hgdeshmukh1234@gmail.com

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

antioxidant qualities, including vitamin E,cyclohexane, coumarin, acetic acid, stigmasterol, sitosterol, dimethoxy phenol, and catechol.(3)

By combining current information with empirical data, we hope to shed light on the possible benefits of using orange peel into skincare regimens and product formulations.In the end, this review's main goals are to lay the foundation for thoughtful debates, promote additional study, and develop potential applications that close the knowledge gap between conventional wisdom and contemporary scientific understanding in the field of skincare barriers against UV damage.

Fig No 1: Vitamin C

Vitamin E is a fat-soluble antioxidant widely used in cosmetic and dermatological formulations due to its protective and nourishing effects on the skin.(4). Numerous physiological functions, including as energy metabolism, neuron function, red blood cell creation, and DNA synthesis, are known to be significantly impact the B-vitamins. Orange peels have a relatively low concentration of B vitamins, but they do add to the nutritional makeup of the fruit overall. Additionally, orange peels are thought to be a significant source of the fat-soluble antioxidant vitamin E. (5)

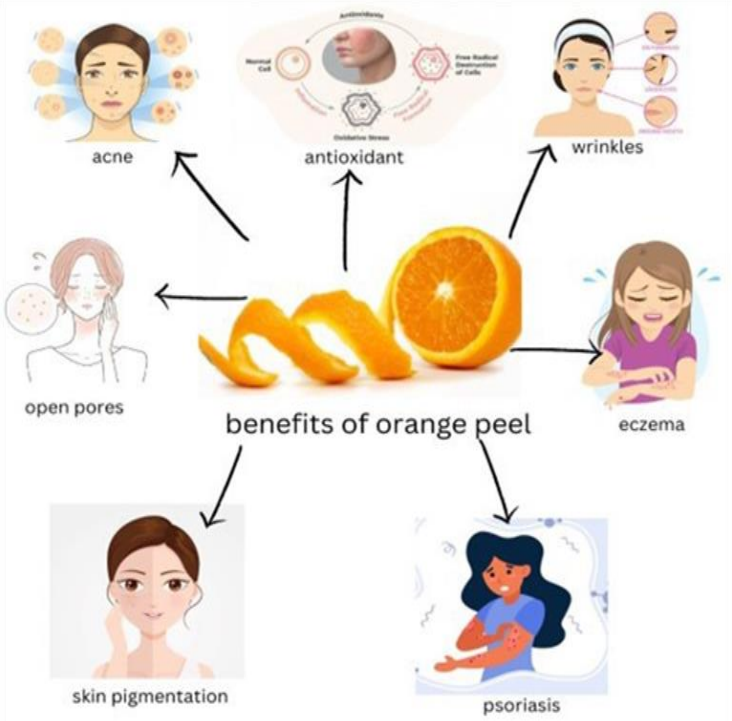

Fig No 2: Benefits of orange peel

Natural Sources of Vitamin C &E

Vitamin C is abundant in citrus fruits, green leafy vegetables, tomatoes, potatoes, cabbage, and Vitamin E is synthesized by plants and must be obtained through dietary sources.(6,7)

Deficiency Symptoms

Though uncommon in developed regions, vitamin C & E deficiency can result from prolonged Inadequate intake (less than10 mg daily for over a month), poor diet, smoking, substance Abuse, or limited fruit and vegetable consumption.(8,9)

Key Symptoms Include

a.Brushing and Skin Spot from ruptured blood vessels.

b.Delayed wound healing.

c. Dry Skin and Premature aging.

Vitamin E and C In Skin Care(10,11)

The skin's high vitamin C content suggests that it serves several vital biological purposes that are related to skin health. Evidence for other functions is starting to surface, although collagen production and antioxidant protection have received the most attention based on our understanding of vitamin C activity.(12, 13)

Vitamin C increases the synthesis of collagen mRNA by fibroblast stabilise the collage molecule through hydroxylation. Strong antioxidant, vitamin C may neutralise and eliminate oxidants, including those present in environmental contaminants and following Uvradiation exposure. Because of its function in reproduction, it was found. Phytol-chain saturation (saturated and unsaturated, respectively) is where tocopherols and tocotrienols differ from one another. Vitamin E may have photoprotective and antitumorigenic effects, according to experimental research.In dermatological practice, there are few controlled clinical that support clearly defined dosages and clinical indications of vitamin E use.(14, 15)

Fig No 3: Antioxidant activity of orange peel.

Because vitamin C regenerates oxidized vitamin E, their combination offers better the photoprotection than either alone. In several human studies, oral co-supplementation of vitamins C + E increased the Minimal Erythemal Dose (MED) (i.e. skin's resistance to UV) and reduced DNA damage after UV exposure.Topically, combining vitamin E and vitamin C is a common strategy in formulations to stabilize antioxidants, enhance efficacy, and extend protection.

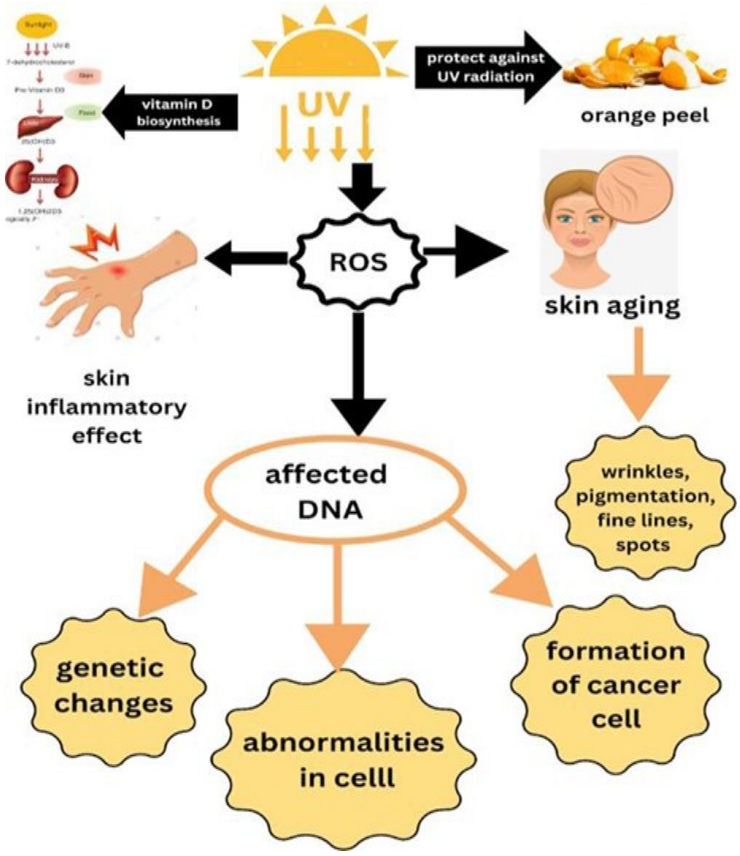

Fig No 4: UV Effect on Skin

Advantages and Benefits of Serum.(16,17)

1. Stronger photoprotection (UV-damage / sunburn / DNA protection)

A study comparing 15% L-ascorbic acid (Vit C) + 1% α-tocopherol (Vit E) vs either alone on pig skin found that the combination provided superior protection from erythema (redness), sunburn cell formation, and thymine dimer.(18- 20)

2. Better reduction of hyperpigmentation / uneven pigmentation

In a trial of treatment for chloasma and pigmented contact dermatitis, the combo of Vitamin C + Vitamin E was significantly more effective than either alone in lightening pigmentation and improving skin luminosity. (21)

3. Synergistic antioxidant action:

Vitamin C can regenerate oxidized Vitamin E. After Vitamin E neutralizes a free radical, it itself can become oxidized, and Vitamin C helps restore it to its active form.

4. Improved skin structural benefits: collagen, firmness, texture:

Vitamin C is essential cofactor in collagen synthesis; works in fibroblasts (young and old) to improve collagen production. When combined with Vitamin E, this effect is enhanced.

5. Reduced inflammation, better healing and skin protection:

The antioxidant combo helps reduce UV-induced inflammation (i.e. erythema), supports skin's repair after damage.

6. Enhanced stability of the formulation:

Vitamin C, especially in its pure L-ascorbic acid form, is unstable: oxidises quickly upon exposure to air, light, etc.

7. Rich in Antioxidants / Protection Against Oxidative Stress:

Many herbs such as green tea, turmeric, and Phyllanthus emblica contain polyphenols and flavonoids that neutralize free radicals from UV rays and pollution, protecting collagen, elastin, and skin cells from oxidative damage.(22)

8. Brightening / Reducing Pigmentation / Evening Skin Tone:

Certain herbal extracts inhibit tyrosinase, the enzyme responsible for melanin production.

9. Hydration / Moisture Retention:

Many herbal serums include humectant or hydrating botanicals such as aloe vera, hyaluronic acid, and plant oils.

10. Improved Skin Elasticity / Anti-Aging Effects:

Herbal antioxidants help reduce collagen degradation and stimulate collagen synthesis.

11. Soothing / Calming Effects / Reduced Irritation:

Herbs like aloe vera, chamomile, and calendula possess natural anti-inflammatory, cooling, and healing properties.(23, 24)

12. Repair and Regeneration of Skin:

Certain herbal compounds promote wound healing, skin repair, and regeneration after damage caused by sun exposure, acne, or micro-injuries.

13. Better Absorption and Targeted Action:

Herbal serums are lightweight and concentrated, allowing plant-based active ingredients to penetrate deeper into the skin.(25,26)

14. Fewer Harsh Synthetic Ingredients;

Herbal serums generally avoid parabens, harsh preservatives, and synthetic fragrances.

15. Environmental and Sustainability Advantages:

Using botanical ingredients sourced responsibly helps reduce environmental impact.

A. Advantages of serum (27,28)

1. Dual Antioxidant Synergy (Vitamin C + Vitamin E)

2. Enhanced Collagen Formation

3.Improved Stability Through Vitamin E

4.Natural Herbal Base

5.Anti-Inflammatory and Healing Properties

6.Hydration and Barrier Support

B. Benefits of serum

1.Brightening and Radiance Boost

2. Anti-Aging and Firmness

3.Protection from UV and Environmental Stress

4.Deep Moisturization and Smooth Texture

5.Natural and Safe for Sensitive Skin

Dos and Don'ts of Serum

Dos (Best Practices for Optimal Use)

1. Patch Test Before Use

2. Cleanse and Tone Skin

3. Correct Application Technique Use 2–3 drops per application.

4. Layering with Other Skincare Products

5. Sun Protection

Don'ts (Mistakes and Precautions)(29)

1. Avoid Application on Broken or Inflamed Skin

2. Do Not Combine Immediately With Strong Acids or Retinol

3. Do Not Skip Sunscreen

4. Avoid Exposure to Heat and Sunlight

Materials and Methods

1. Rose water

Rose water is a naturally occurring hydrosol that is made by steam distilling rose petals.

Dabur Gulabari Premium Rose Water, a well-liked natural toner for washing, toning, and moisturising, was the product used.(30)

2. Capsule of Vitamin E

Strong antioxidants like vitamin E (tocopherol) shield the skin from oxidative damage, encourage

cell renewal, and increase skin suppleness. It nourishes and heals damaged skin when applied topically.

3. Glycerine

A natural humectant, glycerine attracts moisture to the skin to keep it moisturised, soft, and supple. All skin types can use it, however dry and sensitive skin types benefit most from its non-comedogenic properties.(31)

4. Coconut Oil

A natural emollient that is high in fatty acids and antioxidants is coconut oil. With antibacterial and anti-inflammatory properties, it aids in skin hydration and nourishment.

5. Orange Peel Powder

Orange peel contains natural citric acid and vitamin C, which help brighten skin tone, reduce pigmentation, and fade dark spots and scars. It also offers antioxidant and antimicrobial.

Maceration Process

Selection and Preparation of Orange peel:

The peel can be removed using a knife or vegetable peeler.(32)
The white pith should be avoided because it might be bitter and could impact the extract's scent.

Maceration with solvent:

Put 32 grammes of powdered dried orange peel in a jar and use 640 millilitres of ethanol as a solvent. To allow the orange peel to macerate, mix thoroughly with a stirrer and set the container in a cool, dark location away from the sun.(33)

Filtration of Extract:

A strong extract of vitamin C and other active compounds from the orange peel will be present in the combination following the maceration period.(34, 39)

Procedure:

Step1:, take 10 millilitres of orange peel extract.

Step 2: Add orange peel extract in rose water of equal quantity.

Step 3: Stir thoroughly after adding 5 ml of glycerine to the solution above.

Step 4: Include the three vitamin E gel capsule contents.

Step 5: Include 2 millilitres of coconut oil in the mixture above.

Step 6: As a preservative, add 1 millilitre of phenoxyethanol. Use a stirrer to mix this solution, then store it in a cool, dark location.

Step 7: Verify and modify the pH.

Step 8: To shield the serum from light, put it in a dark amber glass bottle.

Step 9: Put a label on it and keep it somewhere cool. Shelf life: 6–12 months.

Evaluation Test for Serum

Organoleptic Property - Organoleptic evaluation of orange peel vitamin c face serum is doing visual inspection. (35)

Appearance – opaque

Colour - brown in colour
Odour – pleasant

State – liquid

Stability - stable at room temperature

P H –

(4-6) The pH value of the film is measured using a digital pH meter. One gramme of film solution was utilised, and the pH was measured.(36)

Spreadability-

Two drops of the sample were taken and put on each piece of butter paper separately. Once a specific amount of time has passed, check the sample's surface area. (37)

Skin Irritation-

Test To check for skin reactions like redness, itching, or burning. Apply a small amount on the area of hand for 24 - 48 hours. (38)

Storage / Stability Test –

Keep samples at different conditions: room temperature, elevated temp (~40 °C), light exposure; check periodically for changes in color , smell, separation.(37,38)

Patch / Skin Test (Safety)-

On small area of skin (e.g. inner arm), apply for 24–48 hours, check for redness, itching.(41,42)

Comparative Test-

Compare with a known good (benchmark) vitamin C + E serum in the same tests to see relative performance. (39)

DISCUSSION:

The physical appearance: of the serum was found to be uniform, homogeneous, and freefrom any phase separation, suggesting good formulation stability**.**

The content uniformity analysis::revealed that the active ingredients, particularly Vitamin C and Vitamin E, were within acceptable concentration limits, confirming that the formulation process preserved the integrity of actives.

Microbial testing: showed the absence of contamination, validating the effectiveness of the preservatives used in the formulation.

The viscosity and Spreadability tests: confirmed that the formulation had a smooth texture and good spreading ability, which are important for user acceptability and effective topical absorption.

The pH value: remained within the skin-friendly range (4–6), ensuring compatibility with the skin surface and minimizing the risk of irritation

CONCLUSION:

This analysis has shed important light on the fascinating field of orange peel and its potential use in improving skin health. This study has examined orange peel's nutritional makeup, anti-inflammatory and antioxidant properties, anti-aging potential, UV protection capabilities, and useful uses in addition to emphasising its value as a natural resource for comprehensive skin care. Numerous vitamins, minerals, and bioactive compounds make up orange peel's nutritional makeup, which is important for supporting skin health and general wellbeing. The intricate way these elements interact shows that orange peel has the potential to be a practical way to improve skin health. Orange peel's potential as a preventive agent against oxidative stress and inflammation, two major factors in skin ageing and damage, has been revealed by research into its antioxidant and anti-inflammatory qualities. These effects are regulated by bioactive compounds such as flavonoids and carotenoids, which strongly support their use in skincare routines. The

chemicals included in orange peel are said to have antiaging qualities since they can make wrinkles less noticeable and increase skin suppleness. This trait is consistent with the larger theme of encouraging the growth of resilient, youthful skin. Vitamin C acts as a potent antioxidant and skin-brightening agent by neutralizing free radicals and promoting collagen synthesis, while Vitamin E enhances skin hydration and provides photoprotective properties. Together, they create a synergistic antioxidant defense system, reducing oxidative stress and preventing premature aging. The inclusion of herbal ingredients such as citrus extracts further enhanced the formulation's efficacy by providing additional phytochemicals and nutrients beneficial to the skin.

Orange peel's potential as a preventive agent against oxidative stress and inflammation, two major factors in skin ageing and damage, has been revealed by research into its antioxidant and anti-inflammatory qualities. These effects are regulated by bioactive compounds such as flavonoids and carotenoids, which strongly support their use in skincare routines. The chemicals included in orange peel are said to have antiaging qualities since they can make wrinkles less noticeable and increase skin suppleness. Vitamin C acts as a potent antioxidant and skin-brightening agent by neutralizing free radicals and promoting collagen synthesis, while Vitamin E enhances skin hydration and provides photoprotective properties. Together, they create a synergistic antioxidant defense system, reducing oxidative stress and preventing premature aging. The inclusion of herbal ingredients such as citrus extracts further enhanced the formulation's efficacy by providing additional phytochemicals and nutrients beneficial to the skin.

REFERENCES

1. Kamble S, Pardeshi S, Mujawar N. Formulation and characterization of orange peel extract vitamin C herbal serum for brightening and hydrating effect of skin. [Unpublished manuscript].
2. Gupta P, Tiwari S, Ishak M, Kumar A. Crafting a potent vitamin C serum for radiant and healthy skin. [Unpublished manuscript].
3. Varmie EB, Thakur M. Utilization of citrus processing waste: A review. Pharma Innov J. 2021;10:682–97.
4. Sir Elkhatim KA, Elagib RA, Hassan AB. Content of phenolic compounds and vitamin C and antioxidant activity in wasted parts of Sudanese citrus fruits. Food Sci Nutr. 2018;6(5):1214–9.
5. Montero-Calderon A, Cortes C, Zulueta A, Frigola A, Esteve MJ. Green solvents and ultrasound-assisted extraction of bioactive orange (Citrus sinensis) peel compounds. Sci Rep. 2019;9(1):16120.
6. Kim J, Kim J, Lee YI, Almurayshid A, Jung JY, Lee JH. Effect of a topical antioxidant serum containing vitamin C, vitamin E, and ferulic acid after Q-switched 1064-nm Nd:YAG laser for treatment of environment-induced skin pigmentation. J Cosmet Dermatol. 2020;19(10):2576–82.
7. Nazir A, Itrat N, Shahid A, Mushtaq Z, Abdulrahman SA, Egbuna C, et al. Orange peel as a source of nutraceuticals. In: Egbuna C, editor. Food and agricultural byproducts as important sources of valuable nutraceuticals. Cham: Springer International Publishing; 2022. p. 97–106.
8. Akbari B, Baghaei-Yazdi N, Bahmaie M, Mahdavi Abhari F. The role of plant-derived natural antioxidants in reduction of oxidative stress. Biofactors. 2022;48(3):611–33.
9. Hinek A, Kim HJ, Wang Y, Wang A, Mitts TF. Sodium L-ascorbate enhances elastic fibers deposition by fibroblasts from normal and

pathologic human skin. J Dermatol Sci. 2014;75:173–82.
10. Ivanov V, Ivanova S, Kalinovsky T, Niedzwiecki A, Rath M. Inhibition of collagen synthesis by select calcium and sodium channel blockers can be mitigated by ascorbic acid and ascorbyl palmitate. Am J Cardiovasc Dis. 2016;6:26–35.
11. Kivirikko KI, Myllyla R, Pihlajaniemi T. Protein hydroxylation: Prolyl 4-hydroxylase, an enzyme with four cosubstrates and a multifunctional subunit. FASEB J. 1989;3:1609–17.
12. May JM, Harrison FE. Role of vitamin C in the function of the vascular endothelium. Antioxid Redox Signal. 2013;19:2068–83.
13. Kishimoto Y, Saito N, Kurita K, Shimokado K, Maruyama N, Ishigami A. Ascorbic acid enhances the expression of type I and IV collagen and SVCT2 in cultured human skin fibroblasts. Biochem Biophys Res Commun. 2013;430:579–84.
14. May JM, Qu ZC. Transport and intracellular accumulation of vitamin C in endothelial cells: relevance to collagen synthesis. Arch Biochem Biophys. 2005;434:178–86.
15. Miller RL, Elsas LJ, Priest RE. Ascorbate action on normal and mutant human lysyl hydroxylases from cultured dermal fibroblasts. J Invest Dermatol. 1979;72:241–7.
16. Parsons KK, Maeda N, Yamauchi M, Banes AJ, Koller BH. Ascorbic acid-independent synthesis of collagen in mice. Am J Physiol Endocrinol Metab. 2006;290:E1131–9.
17. Nusgens BV, Humbert P, Rougier A, Colige AC, Haftek M, Lambert CA, et al. Topically applied vitamin C enhances the mRNA level of collagens I and III, their processing enzymes, and tissue inhibitor of matrix metalloproteinase 1 in the human dermis. J Invest Dermatol. 2001;116:853–9.
18. Humbert PG, Haftek M, Creidi P, Lapiere C, Nusgens B, Richard A, et al. Topical ascorbic acid on photoaged skin: Clinical, topographical, and ultrastructural evaluation—Double-blind study vs placebo. Exp Dermatol. 2003;12:237–44.
19. Duarte TL, Cooke MS, Jones GD. Gene expression profiling reveals new protective roles for vitamin C in human skin cells. Free Radic Biol Med. 2009;46:78–87.
20. Geesin JC, Darr D, Kaufman R, Murad S, Pinnell SR. Ascorbic acid specifically increases type I and III procollagen messenger RNA levels in human skin fibroblasts. J Invest Dermatol. 1988;90:420–4.
21. Davidson JM, LuValle PA, Zoia O, Quaglino D Jr, Giro M. Ascorbate differentially regulates elastin and collagen biosynthesis in vascular smooth muscle cells and skin fibroblasts by pretranslational mechanisms. J Biol Chem. 1997;272:345–52.
22. Tajima S, Pinnell SR. Ascorbic acid preferentially enhances type I and III collagen gene transcription in human skin fibroblasts. J Dermatol Sci. 1996;11:250–3.
23. Nagata C, Nakamura K, Wada K, Oba S, Hayashi M, Takeda N, et al. Association of dietary fat, vegetables, and antioxidant micronutrients with skin ageing in Japanese women. Br J Nutr. 2010;103:1493–8.
24. Bissett DL, Chatterjee R, Hannon DP. Photoprotective effect of superoxide-scavenging antioxidants against ultraviolet radiation-induced chronic skin damage in the hairless mouse. Photodermatol Photoimmunol Photomed. 1990;7:56–62.
25. Shukla A, Rasik AM, Patnaik GK. Depletion of reduced glutathione, ascorbic acid, vitamin E, and antioxidant defense enzymes in a healing cutaneous wound. Free Radic Res. 1997;26:93–101.

26. Steenvoorden DP, Van Henegouwen GM. The use of endogenous antioxidants to improve photoprotection. J Photochem Photobiol B. 1997;41:1–10.
27. Shapiro SS, Saliou C. Role of vitamins in skin care. Nutr. 2001;17(10):839–44.
28. Keen MA, Hassan I. Vitamin E in dermatology. Indian Dermatol Online J. 2016;7(4):311–15.
29. Eberlein-König B, Ring J. Relevance of vitamins C and E in cutaneous photoprotection. J Cosmet Dermatol. 2005;4(1):4–9.
30. Januszewski J, Forma A, Zembala J, Flieger M, Tyczyńska M, Dring JC, et al. Nutritional supplements for skin health—A review of what should be chosen and why. Medicina. 2023;60(1):68.
31. Parrado C, Philips N, Gilaberte Y, Juarranz A, González S. Oral photoprotection: Effective agents and potential candidates. Front Med. 2018;5:188.
32. Fernández-García E. Skin protection against UV light by dietary antioxidants. Food Funct. 2014;5(9):1994–2003.
33. Burke KE. Interaction of vitamins C and E as better cosmeceuticals. Dermatol Ther. 2007;20(5):314–32.
34. Jagdeo J, Kurtti A, Hernandez S, Akers N, Peterson S. Novel vitamin C and E and green tea polyphenols combination serum improves photoaged facial skin. J Drugs Dermatol. 2021;20(9):996–1003.
35. Lin JY, Selim MA, Shea CR, Grichnik JM, Omar MM, Monteiro-Riviere NA, Pinnell SR. UV photoprotection by combination topical antioxidants vitamin C and vitamin E. J Am Acad Dermatol. 2003;48(6):866–74.
36. Pullar JM, Carr AC, Vissers M. The roles of vitamin C in skin health. Nutrients. 2017;9(8):866.
37. Farris PK. Topical vitamin C: A useful agent for treating photoaging and other dermatologic conditions. Dermatol Surg. 2005;31:814–18.
38. Venkanna A, Champawat PS, Jain SK. Study on drying kinetics of coriander leaves using different drying techniques. J Pharmacogn Phytochem. 2019;8(3):3887–95.
39. Shukla S, Singh VK, Singh DK. Effect of single, binary, and tertiary combinations of few plant-derived molluscicides alone or with synergists on enzymes in the nervous tissues of the freshwater snail Lymnaea acuminata. Pestic Biochem Physiol. 2006;85(3):167–73.

HOW TO CITE: Harshal Deshmukh*, Rakshada Dhudkekar, Dr. Swati Deshmukh, Citrus Shield Vitamin C And E Enriched Skin Serum, Int. J. of Pharm. Sci., 2025, Vol 3, Issue 11, 1088-1098 https://doi.org/10.5281/zenodo.17551658