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The Role Of Nutritional Supplements in Enhancing Skin Health and Aesthetic

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Original Article

ARTICLE INFORMATION

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ABSTRACT

Background: The body's biggest organ is skin, which acts as a protective barrier against our environment and holds hydration and homeostasis in our bodies. Poor diet and increases in chemical and environmental burden can cause negative changes in skin structure and function. In increasing numbers of studies, it has been confirmed that micronutrients are of importance for skin health, and that they are being applied in both therapeutic treatments and cosmetic formulations. With the increasing concerns related to skin care, people have moved for invasive aesthetic methods and nutritional supplements to help with the problems, which nutritional supplements are considered as a brighter and more holistic approach.

Methodology: This was a prospective observational study carried out at Azeem Hospital and Skin Care Centre District Kasur. In total, 291 participants were studied and their use of nutritional supplements, zinc, vitamin C, vitamin B, component, vitamin E, multivitamins, and glutathione, were recorded. Hydration, elasticity, acne, eczema, psoriasis, rosacea, redness, irritation, scars, fine lines, wrinkles, and pigmentation were skin health outcomes assessed. Dietary nutrient intake associated with specific skin conditions was statistically analyzed for the improvements in skin conditions expressed in such parameters.

Results: In this study we analysed 291 participants and used effects of several nutritional supplements like zinc, vitamin C, vitamin B complex, vitamin E, multivitamins, glutathione. Hydration, elasticity, acne, eczema, psoriasis, rosacea, irritation, redness, scars, fine lines, wrinkles and pigmentation outcomes on skin health were assessed. The influence of the supplement Vitamin C in 199 participant (65.6%) comes with no breakouts occurred after use.

We found 207 (71%) who used vitamin C which was the product most commonly used. One hundred ninety-nine patients had no breakouts while 139 patients had dramatic (87%) improvement in pigmentation. Another 121 participants reported marked improvement in skin texture and 117 (81.7%) in scars. Furthermore, 256 (87.97) participants also agreed that vitamin C helped reduce oiliness. Vitamin C also had the highest mode of improvement for all skin concerns as well as a statistically significant higher mean improvement score as compared with other supplements. 18 of 21 (83.2%) participants using multivitamins experienced high improvement in pigmentation without any breakouts. Multivitamins were actually quite effective, though lower than vitamin C, with a moderate mean improvement score and always positive mode. Limited representation with variable or only modest effects were found for other supplements (zinc, vitamin E, glutathione, and vitamin B complex). Finally, the findings of the study revealed that of the almost 71% of the participants who used Vitamin C for treatment of wounds, it was the most effective across all parameters.

Conclusion: This study shows that taking vitamin C very beneficial for skin overall. Vitamin C was the most common used supplement with the highest improvement rates across a range of skin concerns such as reduced breakouts, improved pigmentation, texture and scar reduction. Moderately positive effects were also seen in multivitamins, but less so than with vitamin C. Limited or more variable impacts were found with other supplements, such as zinc, vitamin E, glutathione, and vitamin B complex. Our results emphasize the critical role of certain micronutrients, particularly vitamin C, in maintenance of healthy skin structure and function, and appearance. Vitamin C rich supplements should be taken as a part of the overall skin health regimen by healthcare provider and consumer.

Introduction:

The skin is our outermost and the largest organ which protect our body by following ways. It serves as a very important biological semipermeable barrier; it is a protection against the chemical and physical pollutants and environmental pollutants

such as UV radiation, smoke, and heavy metals but still maintains hydration and general homeostasis (1,2).

The skin is brilliant & natural; it is our primary line of defense against ultraviolet (UV) radiation, chemical exposure and bacterial infection. You also do the service by supplying us with necessary food items that are essential for a healthy skin in case you have taken proper diet. Diet is poor, and it has the bearing on structure and function of skin (3). In this state, the skin barrier has been induced in an atypical way and becomes injurious. Experiments in cell cultures, animal or clinical trials have been conducted in order to confirm a role of micronutrients (i.e., vitamins and minerals) in skin health (4). These were used as an active agent in therapeutic dealings intended to relieve symptoms of various skin diseases, and it seems they were a part of cosmetic cosmetics (5,6).

Buried in two layers, the skin contains various structures like hair follicles, nerve endings, blood or lymphatic vessels and glands. Without proper function of normal skin, temperature regulation, water retention, sensation, immune and defense as well as delineating appearance and identity would be compromised. The social, physical and mental wellbeing is thus largely dependent on the skin health and it directly affects human beings (7,8).

With increasing chemical and environmental burdens, skin care concerns are also escalating and people have been dealing with the escalating skin care concerns by invasive aesthetic techniques as well as nutritional supplements. Over the past few years, the most popular invasive aesthetic procedure (Botox and dermal filler injection) have become a means of temporary skin enhancement. Such interventions, however, are expensive, time consuming and may, in many cases, cause side effects (9).

Benefits of Non-invasive Nutritional Intervention:

At the same time, taking nutritional supplements to better health and appearance of skin has become increasingly recognized as a more promising, holistic way of doing so. In other words, the term nutraceutical (nutrition" and pharmaceuticals") refers to the naturally occurring bioactive compounds in foods or byproducts with supposed human health benefits that include the skin (10,11).

Skin health and aesthetics have another factor which is the age factor. Aging results in loss of collagen, elastin and glycosaminoglycans and hence makes the skin to sag, dry and wrinkled (12). With aging, the nutritional deficiencies in the body further impact the skin health. But, the aesthetic solutions like collagen hydrolyzed supplements also improves the skin hydration, elasticity and texture but only when you are about 30 year age (12). Combined, collagen, vitamins, antioxidants and even active ingredients such as glucosamine and L-carnitine create these nutraceuticals, and they have the ability to improve the health of skin and joints while supporting overall health with the ability to reduce oxidative stress and improve mental health. All these interventions will prove as a valuable solution to the age related skin & cartilage concerns and also to improve aesthetics (11,13).

In our lives, there are some cosmetic products to be thought upon daily and they are used for enhancing beauty and keeping skin in healthy condition (14,15).

Interestingly, there's a growing preference for non-invasive methods to enhance skin health. Nutritional supplements, like those containing Vitamin C is gaining popularity as people seek ways to improve skin health from within. This shift reflects a broader societal move towards preventative health measures and a desire for natural, holistic approaches to beauty. The demand for such interventions underscores the increasing importance placed on skin health as a vital component of overall wellness (16).

Current Invasive Aesthetics Procedures:

As chemical and environmental burdens increase, so do skin care concerns; individuals commonly address these growing skin care concerns via invasive aesthetic techniques as well as via nutritional supplements. The most popular invasive aesthetic procedures [Botox and dermal filler injections] have expanded recently as means to temporarily improve the appearance of the skin. But such interventions can be expensive, require time and, in many cases, risk side effects (17).

Skin aesthetics is done by various aesthetics techniques such as Hyaluronic Acid fillers, Botulinum toxin (Botox), Laser resurfacing, Platelet rich plasma (PRP) therapy and microneedling (18). Some studies have shown that fish collagen peptides helped improve skin hydration and elasticity of women after 6 months of supplementation. This is means that nutritional supplements with the intervention or invasive techniques can enhance a lot skin health and aesthetic outcomes (19). Furthermore, taking hydrolyzed fish collagen daily for at least 90 days makes the skin elastic and yields better texture. (20).

Yet another technique is Microneedling, which is a minimally invasive aesthetic technique, which creates micro injuries to the skin and initiate collagen synthesis (21). Recent studies and advancements in the area of nanotechnology have further enlarged and improved the delivery, bioavailability of these active ingredients in these cosmetic products (21, 22). One of the most commonly used and useful treatments is microneedling, or collagen induction therapy. Serious dermatological procedures in which a dermatologist employs ultra-fine needles to induce tiny controlled micro injuries, boosting collagen and elastin production by skin (23).

The Role of Vitamins in Skin Health:

Vitamins are an integral contribution to keeping the skin in good health and being aesthetically appealing. Vitamin A (retinol) is needed for the appropriate differentiation and proliferation of the epidermal cells, to have normal skin barrier function and young looking skin. As an important antioxidant, vitamin C is necessary for the synthesis of collagen, the structural protein that provides skin its hardness and smoothness (24). Another powerful antioxidant, vitamin E also protects the skin against free radicals, as they are the source of the premature signs of aging. In addition, the B complex vitamins, such as B3 (niacin) and B5 (pantothenic acid) help in various metabolic processes supporting skin health by keeping the skin evenly moisturized and accelerate the skin's natural healing process (25). By promoting skin health, enhancing aesthetic appeal of skin and reducing the signs of fine lines and wrinkles, an adequate intake of these essential vitamins is important through a balanced diet or supplementing these vitamins (26, 27).

Cosmetic dermatology procedures have become very popular in recent years as they provide an array of non invasive and

minimally invasive procedures for skin rejuvenation as well as aesthetic enhancement. However, chemical peels, laser treatments, fillers and neuromodulators are all procedures that give results initially and help keep skin healthy and young over the long term (28, 29).

Also, the use of dermal fillers and neuromodulator of the face like Botox has become more common in cosmetic dermatology. However, these treatments can significantly decrease the appearance of fine lines and wrinkles, and restore volume and facial features for a much younger and rejuvenated appearance (30).

Although these minimally and noninvasive procedures have become the standard, they are not without the possibility of risk or complication. These interventions must be carefully selected to the proper patient, be done properly, and closely monitored by experienced dermatologists to ensure safety and efficacy (19, 31).

Vitamin A

A study is made of the association between vitamin A deficiency and follicular keratosis (which also is called phrynoderma or keratosis pilaris). According to the author, while vitamin A deficiency may be part of the cause, it is unlikely to be the sole cause. Instead they suggest the condition is a reaction in the skin of those predisposed to such a reaction to a number of factors putatively comprising trauma (cold injury) and dietary deficiencies of vitamin A, vitamin E, vitamin B, and fatty acids, either dietary or due to malabsorption (31, 32).

Vitamin C (L -Ascorbic Acid)

Antioxidant properties and collagen synthesis make vitamin c a water soluble vitamin that is well known for supporting the structure of the skin. Vitamin C is used to protect the skin from oxidative stress and UV damage which cause premature ageing, development of wrinkles and age spots (33,34).

Vitamin E

There are 8 different forms of Vitamin E, all of which are fat soluble antioxidants. It is the α-tocopherol of these forms which is the most potent form of vitamin E referred to previously as the 'vitamin of youth' and is commonly used in cosmetics due to its antioxidant and anti inflammatory properties (35).

Zinc

About two to three grams are the average amounts of zinc found in the body of the average adult because it is widely distributed throughout the human body. The skin is a particularly zinc rich tissue in human body being third most abundant. The majority of the zinc within the skin is more concentrated within the epidermis, the outermost layer of the skin, as compared to the deeper dermal layer (36).

Skin Hydration

Hydration is only part of the story, as improvement of the skin barrier function and making it more resistant to environmental stressors, lessening trans epidermal water loss, and smoothing skin texture are all included (37, 39).

The Important Finding of the study reveals that microneedling is efficacious for therapy of acne scars, wrinkles, and pigmentation with the minimum recovery time when compared to the laser or chemical peel treatment. However, combination therapies help enhance ideal outcomes in both skin rejuvenation and hair regrowth. For darker skin types, it is less risky of causing hyperpigmentation. Personalized approaches, realistic expectations, and post care are responsible for patient satisfaction (38).

Therefore, with regards, all the above studies, we have the conclusion that Nutritional supplements can definitely help in improving skin health and skin aesthetic. Antioxidants such as Vitamin C, Vitamin E and carotenoids can be supplemented orally to protect the skin from oxidative stress, boost collagen production and thus promote the skin elasticity, firmness and reduce the formation of wrinkles (11,39, 40, 42).

In summary, a comprehensive approach incorporating both oral supplements and topical treatments can be an effective strategy for enhancing skin health and achieving desired aesthetic outcomes (11,12,41,43). To sum up, a combined method including both oral supplements and topical treatments can be an efficient and practical way to improve skin health and realize aesthetic goals. Continued efforts to study nutritional interventions in this field need to be carried out.

Methodology:

Research Design: This study employed a prospective Observational Study design

Clinical Settings: This study was conducted at Azeem Hospital and Skin Care Center District Kasur.

Sample Size: The sample size was 291

Sampling Technique: A convenient sampling technique was utilized to recruit participants for this study.

Duration of Study: The duration of study was 04 months.

Data Collection Procedure: Data for this study was collected using a structured questionnaire.

Data Analysis: Data was analyzed using the Statistical Package for the Social Sciences [IBM® SPSS® Statistics, Version 29]. Descriptive variables will be presented in frequencies, percentages, mean and standard deviation [SD], median. Chi-square test was used to evaluate the outcome and improvement.

Results:

Table 1: Gender distribution of the study

Gender	Frequency	Percentage	Cumulative %
Female	183	62.9	62.9
Male	108	37.1	100.0
Total	291	100.0	100.0

Table 2: Gender distribution of the study

Age	Frequency	Percentage	Cumulative %
18-25	94	32.3	32.3
25-30	179	61.5	93.8
30-35	14	4.8	98.6
35-40	3	1.0	99.7
40-44	1	.3	100.0
Total	291	100.0	100.0

Table 3: Skin issues participants were presented with

Skin Issues	Frequency	Percentage	Cumulative %
Dryness	16	5.5	5.5
Redness	21	7.2	7.2
Irritation	9	3.1	3.1
Rosacea	5	1.7	1.7
Pigmentation	7	2.4	2.4
Scars	6	2.1	22.0
Fineline	2	.7	22.7
Acne	225	77.3	100.0
Total	291	100.0	100.0

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Table 4: Overall skin health of the participants

Skin Health	Frequency	Percentage	Cumulative %
Excellent	6	2.1	2.1
Good	114	39.2	41.2
Fair	158	54.3	95.5
Poor	13	4.5	100.0
Total	291	100.0	100.0
P-value			0.052

Table 5: Skin care products used by the participants

Skincare Product	Frequency	Percentage	Cumulative Percentage
Moisturizers	28	9.7	9.7
Anti-aging creams	17	5.8	15.5
Sunscreens	221	75.9	91.7
Serums	24	8.4	100.0
Total	291	100.0	100.0

Table 6: Current Skin Condition:

Current Skin Condition	Frequency	Percentage	Cumulative Percentage
Acne	242	83.2	83.2
Eczema	39	13.4	96.6
Psoriasis	10	3.4	100.0
Total	291	100.0	100.0

Effect on Skin Oil:

In the 291 participants, 207 participants used Vitamin C at the most. A large majority (136 participants) have significantly showed that their skin felt less oily. The second most commonly used were multi-vitamins, with 21 of those participants, in 18 it was significantly observed less oiliness in the skin.

Table 7: Effect on Skin Oil:

Supplements	Less	Moderate	High
Zinc	0	0	1
Vitamin C	66	3	136
Vitamin B Complex	0	1	0
Vitamin E	0	0	3
Multi Vitamins	2	1	18
Glutathione	0	0	0
Total	68	5	156

Effect on Scar:

The most commonly used supplement was the Vitamin C followed by 207 participants that reported using Vitamin C. For the most part (117 participants), we noticed a big improvement in skin scars; for another 85, there was no improvement at all; some of them had negligible or moderate improvement.

Table 8: Effect on Scar

Supplements	No Change	Less	Moderate	High
Zinc	0	0	0	0
Vitamin C	85	3	2	117
Vitamin B Complex	0	0	1	0
Vitamin E	2	1	0	0
Multi Vitamins	3	0	0	18
Glutathione	0	1	0	0
Total	90	5	3	135
P-value				0.047

Table 9: Effect on Dark Spots and Pigmentation:

Supplements	No Change	Less	Moderate	High
Zinc	1	0	0	0
Vitamin C	84	1	1	121
Vitamin B Complex	1	0	0	0
Vitamin E	3	1	0	0
Multi Vitamins	3	0	0	18
Glutathione	0	1	0	0
Total	92	3	1	139
P-value				0.081

Table 10: Effect on Skin Texture:

Supplements	No Change	Less	Moderate	High
Zinc	0	0	1	1
Vitamin C	80	1	2	123
Vitamin B Complex	0	0	1	0
Vitamin E	0	1	1	1
Multi Vitamins	1	1	1	17
Glutathione	0	0	0	1
Total	81	3	6	143
P-value				0.191

Effect on Skin appearance and health:

The supplement which was used most frequently was vitamin C, with 139 of those participants reporting a high level of improvement, 4 moderately improved, 64 slightly improved, and 10 found no improvement. Second most effective were multi-vitamins, with 18 participants reporting high level, 1 moderate, and 3 slight improvements. Less frequently other supplements, such as Vitamin E, zinc, vitamin B complex, as well as glutathione were used.

Table 11: Effect on Skin appearance and health:

Supplements	Less	Moderate	High
Zinc	0	0	1
Vitamin C	64	4	139
Vitamin B Complex	0	1	0
Vitamin E	0	3	3
Multi Vitamins	3	1	18
Glutathione	0	0	1
Total	67	8	159
P-value			0.091

Table 12: Effect on Skin Breakouts:

Supplements	No Change	Fewer	No Breakouts
Zinc	0	1	0
Vitamin C	1	7	199
Vitamin B Complex	0	0	0
Vitamin E	1	0	1
Multi Vitamins	0	5	15
Glutathione	0	1	0
Total	2	14	215
P-value			0.010

Conclusion of Results: The study involved a total of 291 participants, who had their effectiveness of various supplements in treating concerns associated with the skin were comprehensively assessed such as oiliness, scars, texture, pigmentation, breakouts, appearance and overall health. The statistical measures, in mean, mode and percentage were very significant to illustrate the effects of each supplement.

The most often used supplement was vitamin C, with 207 participants (71.1% of the total population) using it. Of these, 199 (68.4 %) had no break out and 139 (47.8 %) had remarkable improvement on pigmentation. Moreover, 121 participants (41.6%) found a lot of improvement of the skin texture and 117 participants (40.2%) observed marked improvement on scars. 256 (86.7%) strongly agreed to that Vitamin C helped reduce oiliness. Further, Vitamin C outcomes pointed consistently towards highest improvement mode in all skin concerns and there was also significant higher mean improvement score as compared to other supplements.

Twenty-one participants (7.2% of the total population) used multi vitamin. Of those, 18 participants (6.2%) experienced high improvement with pigmentation and 15 (5.2%) showed no breakouts. Additionally, 17 participants (5.8%) reported very good improvement in skin texture. And although it was lower than Vitamin C, multi-vitamins' were, overall, fairly effective and participant responses were less varied. For multi-vitamins, the mean improvement score was moderate, and the mode was consistently positive.

A smaller fraction of the population used other supplements (such as Zinc, Vitamin E, Vitamin B Complex, Glutathione), which tended not to have any effect or to have variable effects. Participant 1 (0.3%) used zinc, which was also subjectively highly useful for improving pigmentation and texture. 3 participants used vitamin E (1.0%), of whom 1 (0.3%) had no breakouts, 3 (1.0%) had high improvement in pigmentation. 1 participant (0.3%) reported using glutathione (reported high improvement in pigmentation); another participant (0.3%) used vitamin B complex (reported moderate improvement in skin texture). Statistical significance was constrained by low population percentages of these supplements, and the mode oftentimes was zero or represented isolated positive outcomes.

Finally, the findings of the study revealed that of the almost 71% of the participants who used Vitamin C for treatment of wounds, it was the most effective across all parameters; that is, the highest mean improvement score and the same resulted in the most common mode. Another 7.2% tried multi vitamins, which also produced some solid results with regard to pigmentation and preventing break outs. Other supplements had comparatively limited representation and presented variable or only modest effects. This confirmed the value of targeted supplementation, especially Vitamin C and multi-vitamins, for addressing skin concerns, and underscored the need for further work to maximize such use.

Discussion:

The objective of the study was the evaluation of the nutritional supplements (vitamin C, multivitamin, zinc, vitamin E, and vitamins) on the health and appearance attributes of skin was another objective of this study. The key findings are as follows:

Skin Oiliness: The most common supplement used was vitamin C, of which 207 out of 291 participants (71.1%) noted a reduction of oily skin. Coming second were multivitamins, with 18 (85.7%) of the 21 users finding their skin less oily.

Scar Improvement: Coming in again as the most used supplement was Vitamin C, with 207 (71.1%) out of 291 participants reporting high improvement with their scars, 18 (85.7%) out of 21 multivitamin users also reporting high improvements in their scars.Dark spots and pigmentation: 121 out of 123 vitamin C users (98.4%) got a high improvement in dark spots and pigmentation, which was also high for multivitamin users, 18 out of 21 (85.7%).

Skin Texture: Vitamin C Users, 123 out of 291 vitamin C users (42.3%) had a high level of improvement in skin texture, 17 out of 21 multivitamin users (81%) experienced such an improvement in skin texture. Skin Appearance and Health: 139 out of 291 vitamin C users (47.8%) had a high level of improvement in overall skin appearance and health; 18 of 21 multivitamin users (85.7%) experienced such an improvement.

Skin Breakouts: No skin outbreaks were observed in 199 out of 231 (86.1%) vitamin C users and 15 of 20 (75%) multivitamin users whereas other supplements such as zinc, vitamin E and glutathione were used low and generated mixed or almost no effect in the different skin end points determined in the study.

The findings of this study are congruent to studies in literature relating to the effects of nutritional supplements on skin health and appearance. Scores of studies have come to similar conclusions that vitamin C and multivitamins have superior efficacy at treating chronic disease compared to other types of supplements.

The role of different B vitamins in dermatology was covered by Elgharably et al in which they mentioned the use of niacinamide (vitamin B3) in acne and hyperpigmentation. As it turns out, this study's findings agree with this, and reveal that vitamin C (yet another potent antioxidant) and multivitamins are indeed effective for breakouts, dark spots and overall skin appearance. (37, 43).

The anti-tumorigenic, photoprotective, and barrier-stabilizing properties of vitamin E in skin health are summarized in a study by Thiele and Ekanayake- Mudiyanselage. This study observed only limited efficacy from vitamin E alone, but we could explain this difference in dosage, formulation, or how the nutrients in the multivitamins you used measured up with each other (44).

The efficacy of hand cream with zinc, vitamin E and glutathione was very poor in this study. These results are in line with the careful point of view expressed by Davids et al. about the application of intravenous glutathione for its skin lightening ability (44).

Rostan et al. have suggested that zinc may confer skin health benefits given its being an antioxidant, however our results do not support this possibility. Several factors could be responsible for this discrepancy with the form of zinc employed (oral vs. topical), dosage and/or the outcomes for skin that were measured(55). Although our study involved oral supplementation, Rostan et al. mainly discusses topical zinc application. The observed differences are related to this difference in administration (45).

Moreover, we corroborate our findings of combined collagen and vitamin C efficacy in part with Žmitek et al. Our study showed that they did indeed improve dermis density, skin

texture, and wrinkle severity; however, we also saw improvements in skin oiliness, pigmentation, and breakouts (46).

Our study's convergence of evidence and the available body of evidence from the literature, including's review and Pullar et al.'s review, provides strong rationale to the inclusion of vitamin C and multivitamins use to improve skin health in general (1,11,46).

Limitations: Our research showed vitamin B complex glutathione zinc and vitamin E did not provide sufficient benefit because of specific reasons. The body processes different nutrients in stand-alone forms differently from each other. The human body absorbs lower amounts of zinc when people eat foods with phytates in them particularly plant-based items such as grains and beans. The results might have been weaker because this product did not absorb well enough to help skin health.

Whereas vital vitamin E needs to be inserted into lipids , it is generally used preventively rather than repairing existing damage and needs a good supply of linoleic acid . The poor systemic bioavailability and rapid metabolism of oral glutathione, however, prevent it from being widely effective in oral supplementation form, when compared to intravenous or topical use. Vitamins B play several different roles in the health of the skin (niacinamide helps with the acne while biotin, for example helps your hair and nails), which may have diluted the influence that B-complex supplementation had. For optimized skin health outcomes, we have to optimize the dosage, the formulation, and targeted supplementation.

Conclusion:

The effects of nutritional supplements on aspects of skin health were studied in this study, with vitamin C, multivitamins, zinc, vitamin E, and glutathione being considered. It was seen that vitamin C and multivitamins are the best supplements when it comes to adding on to the skin oiliness, scarring, pigmentation, texture, overall appearance, decreasing breakouts. These results report consistently with extant literature which has long since established the important role that nutrition plays in skin health.

Results have shown that most participants saw significant improvement in skin health after using Vitamin C, from reducing oiliness to improving skin scars and overall skin appearance. But multivitamins also performed extremely well, helping reduce breakouts, as well as improving skin texture and pigmentation. The results point to the need for targeted nutritional supplementation when tackling common skin problems.

The results of this study are in conclusion strongly in favor of using Vitamin C and multivitamins as effective nutritional interventions to improve skin health. The findings expand the understanding of the role between nutrition and the state of the skin, and open the door to more specific and effective approaches to skincare. Large, diverse populations should be studied in future and the synergistic effects of using combinations of different supplements to maximize skin health endpoints should also be investigated.

For future researcher more studies should be conducted to discover right zinc amounts and formats plus the best vitamin E glutenathione and vitamin B complex dosages to give more effective skin support. Research into different ways to deliver supplements topically or orally will help us better use zinc vitamin E glutathione and vitamin B complex for skin benefits. Study teams need to research these supplements across different groups of people for better safety evaluation over extended time periods.

Investigations need to examine how different nutrition supplements work better when added to regular skincare procedures such as moisturizers, serums, and sunscreens. Researchers investigating skin health need to combine information about both what patients eat and how they apply skincare products. Studies need to include more elderly participants and males alongside their research to demonstrate the best methods of improving skin health through nutrition.

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