

Systematic Review

Truths and myths about marketed anti-aging skin products: a systematic review

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ABSTRACT

Aging of the skin naturally occurs with increasing age due to several factors involving the reduction of collagen, elastin and many other proteins which help maintain strength and integrity of the skin. Several strategies and treatments were developed to fight and slow down this unstoppable ongoing natural process, however, many of the widely available products may not be as efficient as advertised. The aim was to discuss and investigate the truths and myths about skin anti-aging products and strategies by reviewing the previous studies conducted on this subject. Google scholar database was explored to search for articles related to the current subjects starting from 2010 till 2021. The included searching terms were a combination of anti-aging strategies and efficacy, anti-aging products and myths, anti-aging products and usage of women and perception and attitude of women and anti-aging strategies. The inclusion criteria included original articles conducted on anti-aging products and strategies and full text articles. A total of 40 articles were obtained, only three articles were eligible for the inclusion criteria. The three studies included a total number of 192 participants. Some anti-aging products were found to improve skin health and improve the level of coarse and fine wrinkles and lines. However, their efficacy was limited and doesn't act as magic.

Keywords: Anti-aging, Products, Strategies, Efficacy, Women, Knowledge

INTRODUCTION

The skin acts as a barrier that segregates the body from the outer environment. It has several roles such as protection of the body from infections by microorganisms, water loss and it has a cosmetic role.¹ Skin aging involves fragility of the skin, loss of elasticity, wrinkles and mottled dyspigmentation.² Skin aging occurs due to the accumulation of effects of several factors including intrinsic (chronologic, genetic, hormonal, metabolic) and extrinsic (ultraviolet A and B, chemicals, toxins).^{3,4} These factors lead to accumulative alteration in the structure and physiology of the skin at

each layer and in the skin appearance, especially on sun-exposed skin areas.⁵

The intrinsically aged skin involves the thinned epidermis, cell loss, fine lines, wrinkles and flattening of the dermal-epidermal junction.^{6,7} The extrinsically aged skin involves mottled dyspigmentation and coarse wrinkling.^{4,5} There are several factors that can speed up skin aging such as pollution, unhealthy nutritional lifestyle, smoking, extreme temperatures and sleep deprivation.⁴ Skin wrinkles are the most visible signs of skin aging. They result from both a reduction in the synthesis and an increase in the breakdown of collagen.⁸

The overall collagen content is reduced by 1% per unit area of the skin surface annually.⁹

A considerable reduction in the collagen content and fibrillin-positive structures may contribute to wrinkles by weakening the bond between the dermis and epidermis of extrinsically aged skin.^{10,11} Collagen will also look disorganized and irregular in older skin.¹² In addition, the total hyaluronic acid in the skin epidermis diminishes markedly as we age, while it remains stable in dermis skin.¹³ Glycosaminoglycans are the primary dermal skin matrix constituents that assist in trapping and maintaining the water content of skin, these compounds may be associated with abnormal elastotic material, undergo wear and tear with aging, become dehydrated and lose its ability to function effectively.¹⁴

The skin folds indicate an aged personality, every individual wants to look younger for the entire life, this led to the discovery of many surgical and non-surgical interventions to improve youthfulness.¹ The skin anti-aging strategies aim to reverse the signs of aging in the dermis and epidermis and they are categorized as cosmetological care, topical medical agents or topical agents, invasive procedures, systemic agents, preventive

medicine, avoidance of external factors and adoption of healthy lifestyle habits.¹

There is no proven effective topical anti-aging treatment or ingredient that completely impedes skin photoaging, but there are products that can reduce and slow down these changes. Many cosmetic products were advertised to reduce the clinical signs of photoaged skin. However, there are very few studies that support these claims. These products may not be as effective as announced.¹ As there were no studies that confirm the efficacy of such products, customers who predominantly are women may be attracted to such products and perceive them as magic or fountain of youthfulness. Therefore, this systematic review was conducted on the available few studies conducted on the efficacy of anti-aging products to investigate the truths and myths about such products.

METHODS

The PRISMA checklist guidance for systematic review and meta-analysis was followed to write this systematic review.¹⁵ We revised electronic databases to select eligible research articles between the year 2010 and the year 2021 including the Google scholar database as it provided a larger number of studies.

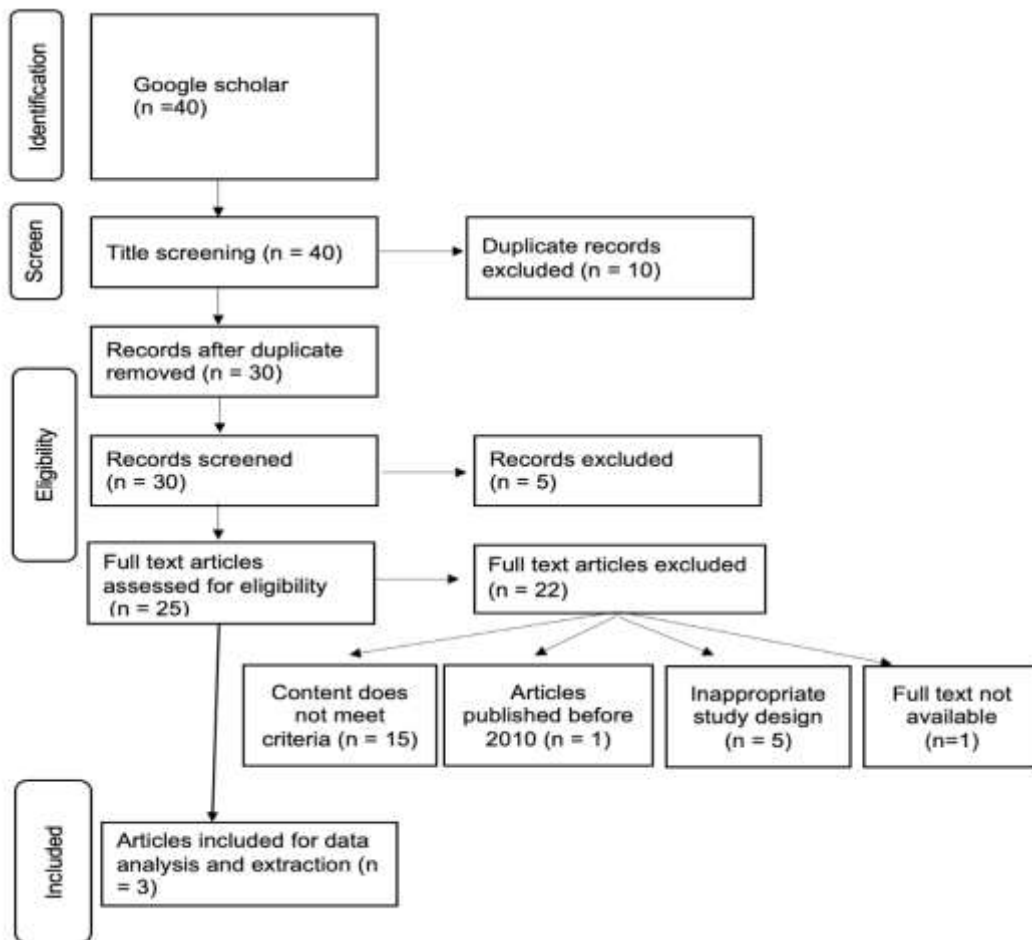


Figure 1: Planning of eligible criteria.

Search strategy

Several keywords were used for searching purposes, including a combination of ‘anti-aging strategies and efficacy’, ‘anti-aging products and myths’, ‘anti-aging products and usage of women’, and ‘perception and attitude of women and anti-aging strategies’. All the titles and abstracts produced from this primary exploration were revised thoroughly to prevent missing potential studies. The obtained articles were then examined to choose only original research articles evaluating the efficacy of anti-aging products, the studies investigated the knowledge, attitude and perception of women toward anti-aging products. Only articles in English were defined as articles of relevance, all original articles conducted on human subjects were eligible, which were then included in the second stage.

Eligibility criteria

The second step was deciding on the inclusion criteria to select the eligible studies. The abstracts of the articles were assessed manually to select the relevant studies for revision. The inclusion criteria were studies conducted on human subjects with cross-sectional, retrospective or prospective study design. The final stage was gathering the pre-defined information from the final record of eligible articles and summarize them. Reviews and studies which had incomplete or overlapped data were excluded. Also unavailable full-text articles or inappropriate study designs were excluded. The full description of the search strategy is shown in Figure 1.

Data review and analysis

Stage one in the data review included a preliminary review using a specifically designed excel sheet to extract selected data. The chosen data from eligible studies were then revised and summarized in one table under specific titles.

RESULTS

This systematic review included three articles that met the eligible criteria (Table 1).¹⁶⁻¹⁸ The three studies were recently published between 2018 and 2017.¹⁶⁻¹⁸ The aim of the three studies were checked, two studies investigated the effect of anti-aging products on the skin, one study investigated the effect of using melatosphere-based cream for two months on skin texture and the other study evaluated the efficacy of topical products including night and day facial creams, night and day lip creams and eye creams to reduce the appearance of wrinkles and transepidermal water loss and to increase skin moisturization.^{16,17} The last study investigated the efficacy of different types of anti-aging products but relied on data obtained from self-assessment of customers.¹⁸ There were two trials included, each of the three studies was of a different study design, one of the trials was an open, prospective evaluator-blinded trial, the other trial was controlled clinical and the third study was a prospective cross-sectional study.¹⁶⁻¹⁸

Table 1: Summary of included studies.

Author and publication year	Aim	Study design	Population	Tools used for assessment	Results and findings
Milani et al 2018 ¹⁶	To evaluate the effects on skin texture of two months of treatment with a Melatosphere™-based cream	Open prospective, evaluator-blinded trial	50 women aged >45 years with mild to moderate facial skin aging (Glogau score 2-4	Antera 3D computer-assisted skin analysis evaluation for the assessment of coarse and fine wrinkles of the periorbital area and melanin content-an evaluator-blinded investigator global assessment (IGA) of skin elastosis, roughness, level of dyschromia, skin dryness and the presence of actinic damage using a four-grade score from 0 (no sign) to 3 (severe sign)-the assessment was performed at baseline and after two months of treatment	t baseline, the mean (SD) IGA score was 8.2 (1.0). After two months the IGA score significantly decreased to 4.2 (1.4) (49% reduction) (p=0.0007); ANTERA 3D evaluations showed a significant reduction in the coarse and fine wrinkle volume in the target area of 31% and 18%, respectively; melanin content was reduced significantly by 17%* topical melatonin carried in Melatosphere™

Continued.

Author and publication year	Aim	Study design	Population	Tools used for assessment	Results and findings
					improves, in the short term, signs of skin aging evaluated clinically and using the antera 3D device in women with mild to moderate skin aging.
Pinsky 2017¹⁷	To evaluate the efficacy of five topical test products intended to reduce the appearance of lines and wrinkles, increase skin moisturization, and reduce transepidermal water loss	A controlled clinical trial for each individual test product and an experience trial	5 women participated in 56 day trial, tested for the effectiveness of the facial (day and night), eye and lip (day and night) creams used as anti-aging	-	The facial, eye, and lip creams are effective anti-aging products that reduce the appearance of both fine and coarse lines and wrinkles, dramatically increase the moisturization of the skin, and, in the case of the face and eye products, reduces transepidermal water loss; these changes last for at least 56 days without significant adverse effects.
Shah et al 2017¹⁸	To determine the efficacy of different type of anti-aging products based on consumer self-assessment and to insight into their perception and knowledge about these products	Prospective cross-sectional	137 females above 35 years old using anti-aging cosmetics for at least 2 months	Survey containing 13 questions	15% of the participants were attracted by container shape and advertisements to purchase; 4% purchase a product depending upon its ingredients; 7% knew the type of ingredients used in anti-aging cosmetics; 33% of the population had a problem of fine line and wrinkles and 13% had rough and dry skin, 18% had a problem of open pores and 11% had age spots, 8% individuals had sagged skin; 23% of the respondents seems to be satisfied with product and 16% does not find the product useful at all; improvement of

Continued.

Author and publication year	Aim	Study design	Population	Tools used for assessment	Results and findings
					fine line/wrinkles was felt by 35%; reduction of pore visibility was felt by 67%; 51% felt an increase laxity; improvement of skin tone was felt by 31% and 59% felt an increase skin hydration; respondents with higher age are not satisfied with the effectiveness of the product no matter if they have been using it for long time; such products do work to improve skin conditions but the claim that wrinkles could be cured completely could not be determined

The total number of included participants was 192 women, one trial included 50 women age older than 45 years with mild to moderate facial skin aging, the other trial included only five women tested for the efficacy of five products, the third study was conducted on 137 females with age older than 35 years and used anti-aging products for at least two months.¹⁶⁻¹⁸ Only two articles stated their assessment tools. One trial reported using Antera 3D cameras and Investigator global assessment (IGA), the former was to evaluate the coarse and fine wrinkles of the periorbital area and the melanin content, whereas the latter was to assess the level of elastosis, roughness, dyschromia, skin dryness and actinic damage.¹⁶ The other study used a survey containing 13 questions.¹⁸

After two months of using melatonin carried in the melatosphere, there was a significant reduction in the volume of coarse and fine wrinkles by 31% and 18%, respectively. There was a significant reduction in the level of skin roughness, skin dryness, actinic damage, skin elastosis and dyschromia. The melanin content was also reduced by 17%.¹⁶ The other trial lasted for 56 days, reported that the five anti-aging products increased skin moisturization, reduced water loss and reduced the appearance of fine and coarse lines and wrinkles.¹⁷ Based on the perspectives of women who used these anti-aging products, 23% of females were satisfied with these products and 16% reported that the products were not

useful at all. Only 35% reported improvements on the fine lines and wrinkles, 67% reported a reduction in pore visibility, 31% reported improvement in skin tone and 59% reported an increase in skin hydration. Only 7% of women knew the type of ingredients used in anti-aging cosmetics, 4% purchased the products depending upon their ingredients and 15% were attracted by container shape and advertisement to purchase the products.¹⁸

DISCUSSION

The signs of aging become obvious as life progresses, and the primary proof of the aging process is the changes of the skin.¹⁹ Some of the common and well known anti-aging strategies like changing the diet, staying hydrated and using over-the-counter skincare products aim to reduce the appearance of fine lines and wrinkles and prevent the new ones from appearing.²⁰ Another skin anti-aging therapy involves visiting professional dermatology clinics for surgical procedures and fillers that could lift the aged skin and give it back its tensile strength for a more youthful appearance. Some of the anti-aging treatments can be obtained by consulting a dermatologist and get a prescription for a suitable anti-wrinkle cream that would be useful and lead to considerable results. However, the fastest results can be obtained by undergoing a cosmetic procedure.²¹ This clarifies that the optimal results obtained from the use of anti-aging products, if they are effective are slow.

There are two main categories of agents that can be used as anti-aging ingredients including antioxidants and cell regulators. The antioxidants involve several components such as vitamins, flavonoids, and polyphenols, which reduce the degradation of collagen, whereas the cell regulators involve peptides, retinol and growth factors which have direct effects on the metabolism and affect the production of collagen.⁵ The combination of vitamins C and E results in higher protection against the oxidation process compared to each of them alone.^{22,23}

Vitamins C, B3 and E are the most important antioxidants as they have the ability to penetrate the skin due to their small molecular weight.²⁴ It was reported that vitamin C in a concentration ranging between 5% to 15% provides major skin anti-aging effects.^{25,26} Vitamin B3 was found to regulate cell metabolism and regeneration, a concentration of 5% was found to have an anti-aging effect.²⁷ In addition, vitamin E has anti-inflammatory and anti-proliferative effects in a concentration between 2% to 20%, however, its effects are not as strong as that of vitamin C and B3.²⁸

It was demonstrated that although there are many various compounds marketed as anti-aging products, there are few studies that proved their efficacy such as the compounds reported previously (vitamin C).^{5,29} However, many individuals continue to use over the counter products.²⁹

In this systematic review, we could only find three studies that were conducted to assess the efficacy of such anti-aging products, two were trials and conducted on anti-aging products whereas one study was conducted based on the subjects' self-reports.¹⁶⁻¹⁸ One trial found that topical melatonin carried in the melatosphere improved the signs of aging in the short term but only improved the mild to moderate skin aging signs.¹⁶ The other trial showed that the night and day cream of face and lip as well as the eye cream were effective against aging skin and reduced the appearance of coarse and fine wrinkles and lines. They also reduced the water loss, which lasted for 56 days with no considerable adverse effects.¹⁷ However, based on opinions obtained from women customers, a small percentage of women were satisfied with their products, reported improvements in lines and wrinkles, and noticed improvements in skin tone, whereas a higher percentage that reached almost 50% and exceeded reported feeling an increase in laxity and hydration and reduction in pore visibility. However, the older age women were not satisfied with the effectiveness of these products. The study could not determine whether wrinkles were completely cured or not.

So, we could conclude that the anti-aging products studied are moderately effective, they are effective against mild to moderate aging signs, and the products could improve signs such as moderate and mild wrinkles and lines. However, in advanced signs such as aging

signs of older individuals, these products are not effective as they are slow-acting and improve the signs of low degrees.

CONCLUSION

Anti-aging products were found to improve skin integrity and improve the level of coarse and fine wrinkles and lines. They can also keep the skin moisturized. However, their efficacy is limited and does not act as magic such as reported in the advertisement. The older females reported less satisfaction with such products, reflecting that the efficacy of these products is limited and can improve the aging signs to a slight degree and does not improve the aging appearance completely. Based on the females' perspectives, a larger proportion of females purchases such products depending on the shape and advertisement of the products, and the fewest proportion purchase them based on their ingredients. Further studies should be performed on the efficacy of different anti-aging products and strategies as there is an increase in the rate of using these products, so their efficacy should be precisely investigated and reported as there are very few studies conducted on this subject.

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