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Review Article

Natural Anti-Ageing Strategies: Prevention and Therapy

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Abstract

Anti-aging tips for naturally minded folks can help you stay young and healthy. We'd all love to live to be healthy and wrinkle-free in our 90s, but the truth is, nothing can stop us from aging. This is particularly true in today's world, which is plagued with aging catalysts like environmental toxins, foods filled with chemicals, poor nutritional values, and dangerous temptations. However, we can keep the aging process from moving at an accelerated pace by making better choices. Several successful aging studies have shown that lifestyle choices are two-thirds_what predicts how well we age. We've all heard the common anti-aging tips: like-Eat tons of fruits and vegetables rich in vitamins, lower your alcohol intake, stop smoking, exercise regularly, stay out of the sun, drink a LOT of water, Meditate etc. These are all great, but there's even more we can do. And you don't have to take synthetic supplements or smear unpronounceable artificial ingredients on your skin to do it. Many of the prominent anti-aging products on the market are packed with harmful chemicals that ultimately make you age faster. Take advantage of nature's best ingredients and prove that you can age successfully.

Keywords: wrinkle free, aging catalysts, environmental toxins, vitamins, etc.

Introduction

Aging is an imperative process for all living organisms. The process of aging start from the time of our birth and gradually becomes clearly visible on the skin with increasing age. Aging leads to psychological, physical and functional changes in the body over time. Aging is at least partly caused by age-related frailty and increased immunodeficiency and possibly mitochondrial dysfunction. [1,2]

There are four types of skin aging: 1. Intrinsic aging 2. Extrinsic aging 3. Photoaging 4. Hormonal Aging

1. Intrinsic Aging: Intrinsic skin aging is a process of chronologically physiological change. Aging of photo protected areas for example, the inner side of the upper arm, is mainly due to intrinsic genetic or metabolic factors. It is an inevitable physiological process that results in thin, dry skin, fine wrinkles, and gradual dermal atrophy.

2. Extrinsic Aging: Extrinsic aging is engendered by external environment factors such as air pollution, smoking, poor nutrition, and sun exposure, resulting in coarse wrinkles, loss of elasticity, laxity, and rough-textured appearance[3,4]. Notably, long-term exposure to solar ultraviolet (UV) radiation is the primary factor of extrinsic skin aging and is referred to as photoaging[5].

3. Photoaging: Photoaging is caused by sunlight which consists mostly of infrared (52-55%), visible (44%) and 3% UV light, which is harmful to the skin and is completely absorbed by the ozone layer[6].

4. Hormonal Aging: It is caused by decrease in collagen synthesis, skin thickness, skin hydration and epidermal barrier function[7,8].

Mechanism of Aging

a. Membrane/ nuclear signalling: UV irradiation provokes reactive oxygen species (ROS) which repress the activity of enzyme protein tyrosine phosphatase κ. This enzyme maintains cell surface receptors of skin, including receptors for epidermal growth factor (EGF), interleukin (IL)-1, keratinocyte growth factor and tumour necrosis factor (TNF)-α in an inactive (hypophosphorylated) state[9]. Activated receptors impel to intracellular signalling through stimulation of the stress-associated mitrogen activated protein (MAP) kinases p38 and c-Jun amino terminal kinase (JNK). Kinase activation induces the transcription of MMPs (matrix metalloproteinase) and decreases expression of the procollagen I and III and TGF-β receptors, with afinal outcome of reduced dermal matrix formation and hence, it reduces the synthesis of collagen[10].

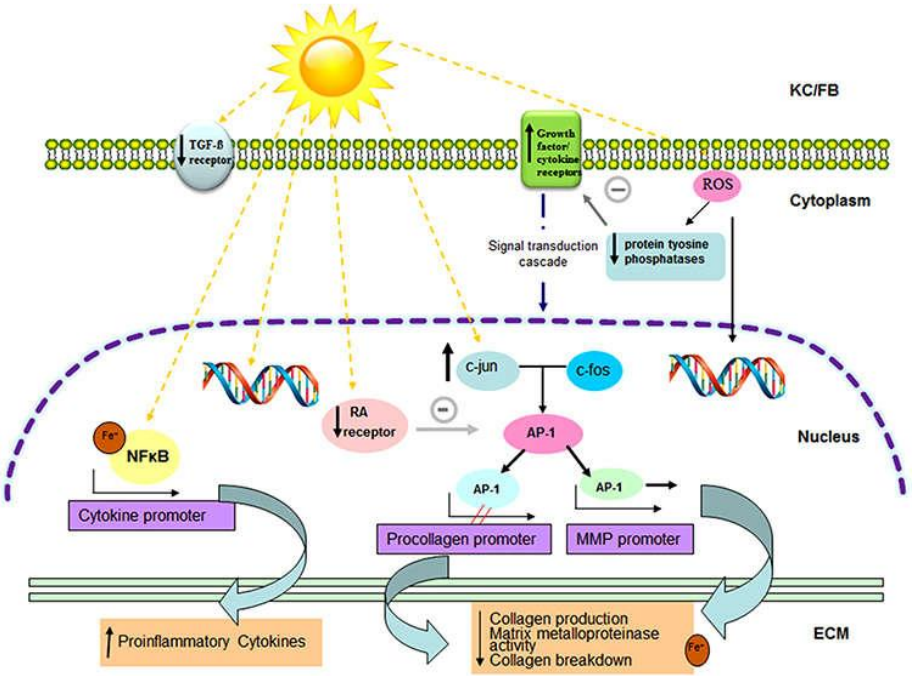

Figure 1: Nuclear Signalling

b. Mitochondrial damage: Mitochondria are cellular organelles that generate energy (ATP) by compelling oxygen. UV effect on the mitochondria electron transport chain produces abundant ROS that can damage mitochondrial DNA (mtDNA). The mitochondrial genome encodes 13 components of the electron transport chain and oxidative damage may be foremost to deletions or rearrangements of the DNA, most likely due to double-strand breaks which may affect mitochondrial ability to generate energy for the cell. It is inferred that the consequent decrease in mitochondrial function photodamaged skin leads to additional accumulation of ROS and further compromises the cell's ability to initiate energy[11].

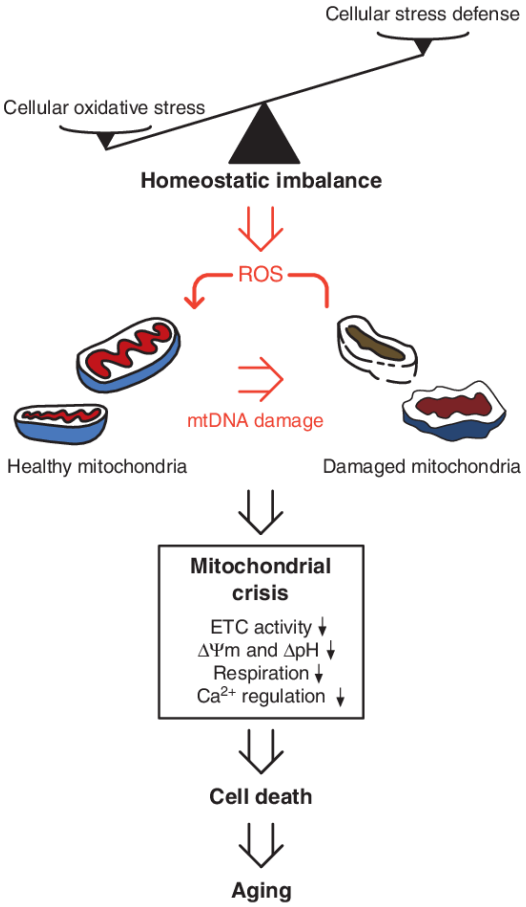

Figure 2: Mitichondrial Damage

c. Protein oxidation: Oxidative damage can also affect proteins and photodamaged skin. Oxidative protein impair may result in loss or gain of activity (i.e. enzymes), loss of structural protein function and increased/decreased susceptibility to degradation[12].

d. Telomere: Telomeres are tandem repeats of a short sequence TTAGGG. It exists in a loop configuration. Telomeres become critically short when this loop is disrupted by cell division or UV irradiation. During cell division telomeres cap (the terminal portion of chromosomes, preventing the fusion of telomeres with each other) cannot be replicated, so the bases of the telomere's caps are lost with each cell division and finally enters a state of senescence or apoptosis. When telomeres are damaged by UV irradiation the loops configuration becomes disclosed and through interaction with the protein activates the tumour suppressor protein p53 and other proteins which responsible for DNA damage and also induces senescence or apoptosis[13].

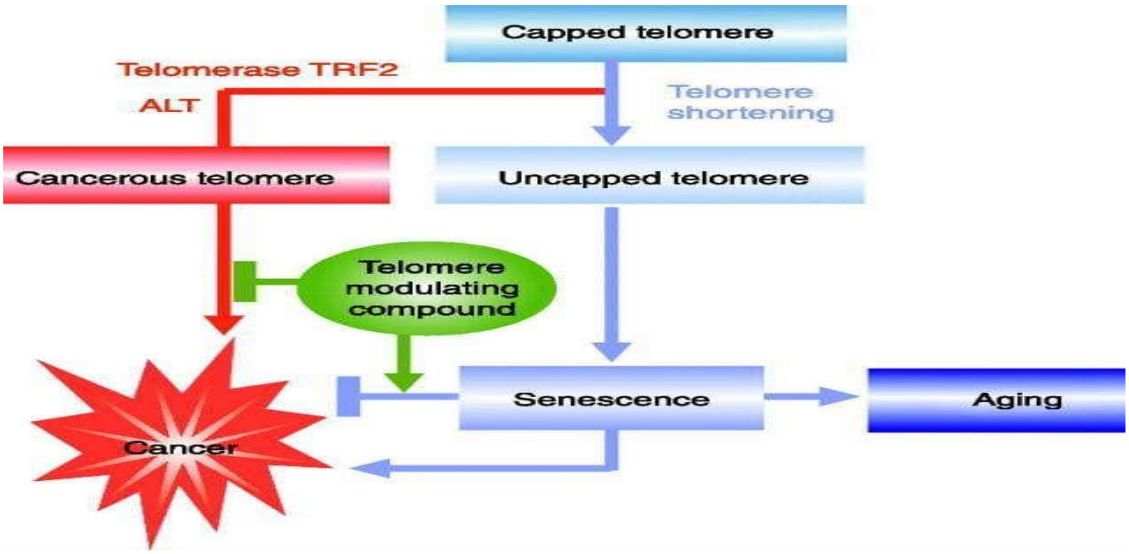

Figure 3: Telomere Shortening

Natural Remedies for Antiaging

Here are seven natural anti-aging secrets you can adopt now:

Anti-aging Tips #1: Start Using Ozonated Oils

The human body is built to detox through the skin, and oxygen is a vital factor in this process. In the past 200 years, the oxygen level has dropped by nearly 20 percent in most places. One of the best ways to get more oxygen into your system is through ozonated oils. They moisturize your skin, improve the appearance of fine lines and age spots, work to calm skin conditions like eczema, fight infections like gingivitis or athlete's foot, and heal cuts, burns and stings. PurO3, America's "leader in ozonated oils," infuses a variety of oils with ozone, an agent that restores the skin's natural beauty while oxygenation cleanses and heals the skin. PureO3 combines ozone with different oils that have so many benefits to produce their preservative-free creams. For example, jojoba oil is a natural antioxidant that can help protect your skin from free radicals and reduce skin inflammation. It also reduces fine lines and hydrates your skin without clogging your pores. This oil has been blended with powerful anti-aging bee pollen and bee's wax in Honey Colony's No3urish.

Figure 4: **Ozonated Oils**

Anti-aging Tips #2: Never Underestimate the Power of Aloe Vera

Aloe vera is rich in vitamins, minerals, amino acids, fatty acids, and water. Its high-water content makes it a great moisturizer and hydrator for your skin, but Aloe Vera is so much more. When used topically, studies show that Aloe increases skin's elasticity (your skin's ability to stretch and then go back to normal). Aloe Vera gel also contains malic acid, an acid known to help reduce wrinkles, and Zinc, a mineral that works to shrink your pores and improve the formation of collagen.

What's so great about aloe vera is that its leaf pulp is rich in fiber and nutrients that provide the body with internal benefits too. Research suggests that, when ingested as a drink, it can soothe the lining of the digestive tract, decrease inflammation, enhance the repair of ulcers in your stomach and intestines, and help your immune system remove toxins using its anti-viral, anti-bacterial, and anti-fungal properties. And detox always leads to anti-aging. So, make sure you take aloe vera both externally and internally.

Figure 5: Aloe vera

Anti-aging Tips #3: Stop Eating Sugar and Start Scrubbing with It

Eating processed sugar can weaken your skin's collagen, which can lead to more wrinkles early in your life. However, sugar-based scrubs can be great for your skin. "Exfoliation is so good for the skin, lending the complexion a fresh polish, and removing any impurities," aesthetician and holistic guru Tammy Fender explains.

Try mixing sugar with lemon juice, a combination that will leave your skin feeling smooth. The sugar crystals exfoliate your skin and peel off dead layers. Lemon juice contains alpha hydroxy acid, which also removes dead skin. Mixing the two together frees up your moisturizer to easily penetrate your pores and hydrate your skin.

Anti-aging Tips #4: Coconut oil — It Isn't Just for Cooking

Coconut oil can be used for more than you'd think. When it is absorbed into your connective tissues and skin, coconut oil helps to reduce wrinkles and fine lines by strengthening your connective tissues and exfoliating the outer layer of your skin. Biochemist and physiologist Ray Peat, Ph.D., told Honey Colony that he considers coconut oil to be an antioxidant. Fender agrees: "It's a powerful antioxidant, and contains vitamins E and A, which are essential in the production of collagen." It even works as an "overnight hair treatment, providing nutrients and leaving hair healthy and shining," Fender says.

Figure 6: Coconut oil

Anti-aging Tips #5: Drink Ginger Tea

Several teas have high levels of antioxidants with anti-aging qualities, but ginger tea stands above them all. Ginger has been around for hundreds of years. People quickly discovered that it contains gingerols in the root antioxidants that protect collagen and help reduce skin damage and inflammation. There are several ways to incorporate ginger into your morning routine. Try shredding ginger and mixing it with honey in hot water or try Fender's unique morning routine. She juices ginger root with turmeric root and blends it into hot water with cinnamon sticks, cloves, Manuka honey, and a large squeeze of lemon. "This blend is warming, bright, golden, and spicy-sweet and packs a big dose of natural antioxidants and anti-inflammatory agents to protect skin and body," Fender says.

Figure 7: Giger Tea

Anti-aging Tips #6: Consume These Anti-Aging Antioxidants — Vitamin E, Vitamin C, And Selenium

Vitamin E, C, and selenium are anti-aging antioxidants that you want in your life. Your sebum already produces Vitamin E for your skin. Studies have shown that it can work as an anti-inflammatory and it can increase collagen production.

Vitamin C plays a crucial role in collagen production and is a key ingredient in many anti-aging skin care products. Taking a vitamin supplement, especially when combined with other micronutrients like vitamin E and

zinc, can help reduce UV-induced sun damage, but using a cream may be even more effective. Vitamin C is not a sunscreen. However, research from the North Carolina Biotechnology Center suggests that when it is topically combined with your SPF, vitamin C can protect against UVB damage (sunburn cell damage). In other words, you maximize skin protection in the sun by combining vitamin C and sunscreen.

Vitamin E can be found in nuts and raw seeds such as almonds, hazelnuts, sunflower seeds, and pumpkin seeds. You can also find it in greens such as kale and spinach. You'll find vitamin C in citrus-based foods like oranges and plant-based sources like strawberries, broccoli, and spinach.

Selenium is an antioxidant that protects your skin, minimizes menopause symptoms, helps prevent heart disease and cancer, and supports cognitive function. A recent study found that elderly participants over 69 with the highest selenium levels exhibited the best cognitive function. Fish is a huge source of selenium, along with Brazil nuts, chia seeds, brown rice, and green vegetables such as broccoli or cabbage.

Figure 8: Antiaging Anti-oxidants

Anti-aging Tips #7: Molecular Hydrogen Is Your Friend

If you haven't heard of molecular hydrogen, you've been missing out! Molecular hydrogen (H2) is an odorless and tasteless gas that links to fighting aging. This antioxidant can enter your cells quickly and repair damage, which is why more than 500 medical studies show that it provides instant benefits. One Japanese study found that participants' neck wrinkles improved after bathing in H2 for three months.

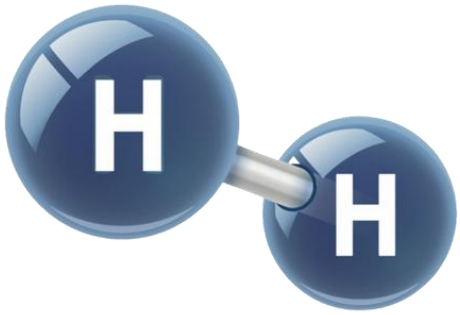

Figure 9: Molecular Hydrogen

The following natural remedies will help you with a younger, smoother and healthier skin.

1. Vitamin C is one of the best skin care products for anti-aging and anti-wrinkle skin care. Vitamin C boosts collagen production in the skin, helps protect the skin against sun and free radical damages, and improves the appearance of fine lines and deep wrinkles. Vitamin C is commonly found in natural skin tightening treatments.
2. Honey is one of the best skin care products in many anti-aging skin care products. This homemade skin care ingredient works as a humectant (helps to retain moisture) to keep your skin well hydrated. Application of honey on to the face will help you get rid of acne and also provides moisturizing anti-aging benefits. Try to do this natural skin care remedy regularly for best results.
3. Add avocado to your skin care routine to get a younger looking skin naturally. The anti-oxidants in this natural skin care fruit reduce free radicals in the human body. Simply apply either the mash or slices of avocado on your face and you will get that rejuvenated look.
4. Evening primrose is the best skin care product for your anti-aging skin care, as it is exceptionally rich in gamma-linolenic acid (8 to 10%), which helps reduce skin inflammation and supports the collagen and elastin structure. Use this anti-aging product for getting a young-looking skin.
5. Egg whites are best for natural anti-aging skin care**.** Apply egg white mask to the lines under your eyes to get rid of under eye wrinkles and restore skin elasticity. This homemade skin care remedy is best for natural skin tightening and you will get younger looking skin.
6. Almond oil is one of the best skin care ingredients in skin care products and a good all-around beauty product. Almond oil help to improve complexions, reduce fine lines and wrinkles apart from curing crow's feet. Many of the best wrinkle creams contain almond oil as a key ingredient for reducing wrinkles and sagging skin.
7. Potatoes have exceptional anti-aging properties for natural skincare. For removing blemish marks and dark pigments on the facial skin, you can rub raw potato slices over the area. This anti-aging skin care home remedy is also best for treating the fine lines and wrinkles on your face. Place two slices of

potato on your eyes for ten minutes, to get rid of crow's feet and under eye wrinkles.

8. Coconut oil is the best natural skin care product for anti-wrinkle treatment as it reduces fine lines and wrinkles and tighten sagging skin. Massage your face with coconut oil before going to bed for reducing skin wrinkles, for natural skin tightening and getting a facelift naturally.

Medical treatments for antiaging

Topical agents:

Retinoids: Retinoids are derivatives of vitamin A. Retinoids are common anti-aging agents used in commercial or over-the-counter (OTC) cosmetical products to treat skin problems such as acne and rosacea and decrease early signs of skin aging such as wrinkles and photoaging[14,15]. Retinoids should not be administered to pregnant or attempting women[16].

Hyaluronic acid: Hyaluronic acid (HA) has been widely used in esthetic medicine to improve skin hydration due to its water-retention properties. HA is one of the extracellular matrix (ECM) molecules produced mainly by mesenchymal cells and widely distributed, with a total of 50% found in the skin. Hyaluronic acid is non-toxic and non-sensitizing; thus, its safe and has been commonly used as a dermal filler to restore skin volume and minimize the appearance of wrinkles[17].

Vitamins B: Topical niacinamide is often used for treatment of hyperpigmentation, photoaging, acne vulgaris and inflammatory skin conditions such as rosacea.

Vitamin C: Vitamin C is a popular cosmeceutical ingredient incorporated in numerous skincare products for hyperpigmentation, photodamage, anti-ageing and acne vulgaris

Vitamin E: vitamin E is another popular ingredient used in commercial products for hyperpigmentation, UV protection, anti-ageing and inflammatory skin disorders (e.g. psoriasis and atopic dermatitis).

Peptides: Peptides, whether it is polypeptides or oligopeptides, are composed of amino acids. Topical peptides are known to be capable of stimulating the dermal metabolism and the synthesis of collagen[18]. Signal peptides can stimulate the signal of extracellular matrix synthesis, especially collagen[19]. They also can promote the synthesis of glycosaminoglycan, proteoglycan, and elastin. As collagen production increases, the skin will look younger and firmer[20].

α-Hydroxy acids (AHA): α-Hydroxy acids use to treat photoaging, acne, ichthyosis, rosacea, pigmentation disorder, and psoriasis by reducing roughness, discoloration, sun keratoses, and pigmentation also increasing collagen density and improving the quality of elastic fiber[21,22]. α-Hydroxy acids also promote further cell growth, thereby lessening the appearance of wrinkles and making the skin look younger[23].

Antioxidants: Vitamins and minerals that have antioxidant properties are the key elements of an anti-aging diet[24]. Antioxidants have a role in preventing and treating skin aging by scavenging the ROS and alleviating oxidative skin damage[25]. Antioxidants such as tocopherol, ascorbic acid, and their derivatives have been used as active ingredients in anti-aging cosmetics[26].

Non-Invasive Procedures:

Laser therapy: Four types of laser therapy are used depending on the concerns being addressed[27].

1. Non-fractionated ablative lasers are the most aggressive; they vaporize the epidermis and papillary dermis, stimulating collagen synthesis and tissue remodeling as the area is re-epithelialized[27,28].
2. Ablative therapy is highly effective but has a prolonged recovery period of 1 to 2 weeks and is accompanied by scarring, infection, and hypo-or hyperpigmentation risks[29]. It produces the most dramatic results of all forms of laser therapy and is used for wrinkles, acne scars, and atrophic scars and for correcting sun-damaged skin.
3. Non-ablative lasers heat the dermis, avoiding the epidermis, and denature dermal proteins to stimulate collagen regeneration[27]. Thermolysis of the dermis can help with wrinkle reduction, skin tightening, irregular pigmentation, and telangiectasias.
4. Fractionation can be applied to ablative or non-ablative lasers and involves narrow columns of light to more accurately target a treatment zone, increase control and lower the risk of scarring, changes in pigmentation, and persistent erythema[30]. Fractionation can create microthermal treatment zones rather than affecting a large area.

Microdermabrasion: Microdermabrasion is used to treat signs of photoaging, such as wrinkles and pigmentation abnormalities, acne, acne scars, and striae distensae. Inert crystals are accelerated over the skin, causing a mechanical erosion of the upper layer of the epidermis. Side effects include pain and erythema; multiple sessions may be needed to achieve acceptable results[28].

Chemical Peels: Chemical peels are acidic solutions of varying strengths designed to induce wound healing and epidermal regeneration. Superficial peels disrupt keratinocytes, causing desquamation. Deep peels can reach as far as the mid-reticular dermis, stimulating the formation of collagen and improving dermal structure. Indications for chemical peels include fine wrinkles, age-related abnormalities in pigmentation, photoaging such as roughness, keratoses, solar lentigines, melasma, post-inflammatory dyspigmentation, and scarring. Side effects include transient or persistent erythema, edema, pigmentary changes, infection (in particular, herpes infection), and scarring.

Minimally invasive procedures:

Neuromodulators: Botulinum Toxin (Botox, Dysport, Xeomin), Botulinum toxin is one of the most frequently used minimally invasive forms of facial rejuvenation.

When injected locally, botulinum toxin type A binds to presynaptic nerve terminals, where it is internalized and undergoes activation by a host-specific protease. The activated toxin prevents muscle contraction by cleaving SNARE proteins essential for transmitting acetylcholine across the neuromuscular junction. With acetylcholine blocked, the affected muscles relax and become paralyzed. The resulting reduction in muscle activity causes a decrease in wrinkles.

Dermal Fillers: Dermal fillers are injectable materials that can improve the appearance of wrinkles, restore volume, and enhance the contours of the face to address signs of aging. The most frequently used fillers are hyaluronic acid, calcium hydroxylapatite, poly-L- lactic acid, and collagen[31].

PRP (Platelet-Rich Plasma) Therapy (Vampire Facial): Platelet-rich plasma (PRP) is an autologous biological product that involves the injection of activated platelets, which stimulate the release of growth factors, triggering fibroblast proliferation and healing via the formation of new collagen, elastin, and extracellular matrices. It's a minimally invasive procedure that can help reduce wrinkles, fine lines, and other signs of aging.

Radiofrequency (RF) Therapy: Radiofrequency is a non-ablative tissue tightening procedure cleared by FDA for the noninvasive treatment of periorbital wrinkles and rhytides[32]. The mechanism is twofold: immediate contraction of existing collagen fibrils and a delayed wound healing response resulting in neocollagen production by stimulated fibroblasts[33].

Ultrasound Therapy (HIFU): Uses ultrasound energy to lift and tighten skin, particularly for sagging skin.

LED Light Therapy: light is delivered through light emitting diode (LED) to activate fibroblasts causing them to produce collagen and elastin[34]. This technique is a safe and effective nonpainful non-ablative modality for improvement of photoaging and can be used in all Fitzpatrick skin types without any adverse effect[35].

Lifestyle adjustments:

Sun Protection: Protecting your skin from the sun's harmful rays is crucial for preventing premature aging.

Healthy Diet: A balanced diet rich in antioxidants and essential nutrients can contribute to healthy skin.

Regular Exercise: Can improve circulation and overall skin health.

Stress Management: Chronic stress can accelerate aging, so managing stress through techniques like exercise or meditation is beneficial.

Supplements for antiaging:

Vitamin c: Vitamin C or ascorbic acid is a water-soluble antioxidant obtained through diet and supplementation. L-ascorbic acid is the biologically active form of vitamin C and acts as co-factor for various enzymes regulating immune function, iron metabolism, and the biosynthesis of collagen, neurotransmitters, hormones and skin barrier lipids[36]. Vitamin C is a popular cosmeceutical ingredient incorporated in numerous skincare products for hyperpigmentation, photodamage, anti-ageing and acne vulgaris[37].

Vitamin D: Vitamin D is a prohormone obtained through diet and produced by epidermal keratinocytes when exposed to UV radiation[38]. Vitamin D also regulates various biological processes in the skin including keratinocyte proliferation, differentiation and apoptosis, and maintaining the skin barrier and immune response[38].

Omega-3 fatty acids: Omega-3 is effective in reducing wrinkles and fine lines. These fatty acids promote collagen production (Omega-3 and collagen production), which improves skin elasticity and firmness. They also neutralize free radicals, preventing oxidative stress that accelerates aging.

Coenzyme Q10: Coenzyme Q10 is an endogenous, lipophilic co-factor present in biological membranes in both its oxidised (ubiquinone) and reduced (ubiquinol) forms[39]. It plays an essential role in the electron transport chain during energy production[38,39]. Ubiquinol acts as antioxidant which protects cell membranes against lipid peroxidation and regenerates other antioxidants (e.g. L-ascorbic acid and α-tocopherol)[38,39]. Anti-ageing products often include coenzyme Q10 in their formulations due to these properties.

Side Effects of Antiaging Products

Anti-aging products can deliver numerous advantages, but they also have the potential to cause adverse effects. Among these are skin irritations such as rashes and a burning feeling, frequently reported with items that include retinol and peptides.

Retinol is an ingredient favoured in many anti-aging creams. It may induce inflammation and irritation of the skin. This is particularly true when it's used at high concentrations or applied excessively often. Issues like redness, dryness, and peeling might occur from its use, which not only causes discomfort but also detracts aesthetically.

For those who have sensitive skin types, peptides—yet another prevalent component found in anti-aging formulations—can prompt conditions like itch-inducing rashes and red patches on their skin. Such undesirable reactions could lead people to stop using skincare products even though there might be long-term gains.

Side effects and complications of neuromodulators are often due to overtreatment or the migration of the drug to unwanted areas and include asymmetry, impaired eyelid function, and the unmasking of preexisting ptosis[40]. Botulinum toxin is contraindicated in pregnancy and patients with neuromuscular disease.

Side effects of dermal fillers usually result from improper technique and can include local ischemia, gangrene, vascular embolism, nerve damage, bruising, erythema, and activation of herpes virus. It is contraindicated in patients with allergies to the ingredients and sites of infection.

The main risk of non-fractionated ablative laser therapy is hypopigmentation and occasionally hyperpigmentation, which is a consideration for patients of color[28].

The persistent application of retinal over time can intensify issues by causing ongoing dryness coupled with irritation on your skin layers. Tracking how your cutis reacts then making necessary usage adjustments is imperative for minimising negative outcomes.

Conclusion

Anti-wrinkle, skin tightening facial treatments are an investment in beauty for life. Home remedies for anti-aging skin care will help to keep you look fresh and youthful with no sign of aging. Wrinkles, crow's feet, fine lines, laugh lines and dark spots are the biggest nightmare of every woman. Most of the women above the age of thirty spend thousands of rupees on many clinical procedures and anti-aging creams to get youthful skin. But do you know that there are many home remedies to fight all signs of ageing without spending a fortune and without any side effects.

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