Changing Scenario of Cosmetic Products for Skin and Hair

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STRUCTURE OF SKIN

The skin consists of two main layers - the epidermis and the dermis. The subcutaneous layer is known as the third layer of skin. The layers are arranged as epidermis, dermis, and subcutaneous layer or hypodermis from outside to inside. The epidermis is the surface layer that comes mostly in contact with the environment and is the first layer affected by any environmental change. It has ridged and patterned surface as visible on the fingertips. The cells are complex and multi-layered. No blood vessels, nerves, or sweat glands are present in this layer. This layer serves the function of a physical barrier for protection against the environment (UV light, heat or cold, bacteria, mechanical disruption, and many chemicals). This layer is a waterproof barrier. The layer also tolerates desiccation thus allowing us to live in a nonaqueous environment. It is essential for the thermal regulation of our bodies. This layer plays a key role in protection from external invasion. The acid mantle which is an exceptionally fine and slightly acidic film (pH 4.5-6.5) present on the surface of the skin acts as a barrier to invasion by bacteria, viruses, or other contaminants that might penetrate the skin. The contaminants and other chemicals (like soap, and cleansers) are alkaline in nature and thus the acidity present on the skin helps to neutralize these chemical effects.

This layer is constantly renewed, , the major cell keratinocytes within the epidermis are formed, mature, and then die. It completely renews itself every 45 to 75 days. The thickest epidermis is present on the palms and soles of the feet. The stratum corneum is the layer of the epidermis that plays the most key role in topical treatment for skin disorders and enhancing appearance. The three main living cell types present in this layer are - keratinocytes, Langerhans cells, and melanocytes. Each cell has a specific role like keratinocytes contains substantial portions of the keratin protein, which is a tough, insoluble protein providing physical protection, rigidity, and strength to the cells. The Langerhans cells also known as the dendritic cells are performing the immune function in the epidermal layer. Melanocytes provide skin color. They perform important barrier function and synthesize melanin, a compound that absorbs UV light and provide ample protection against UV radiation. The basal keratinocytes have cytoplasmic rootlets or serrations (connect like interlocking fingers) that continue into the next layer which is the dermal papillary layer.

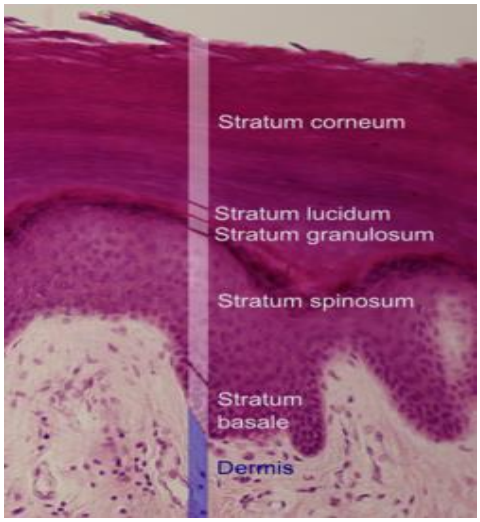

Fig. 1.The figure showing the five layers of epidermis – outer to inner Stratum corneum, stratum lucidium, stratum granulosum, stratum spinosum and stratum basale.

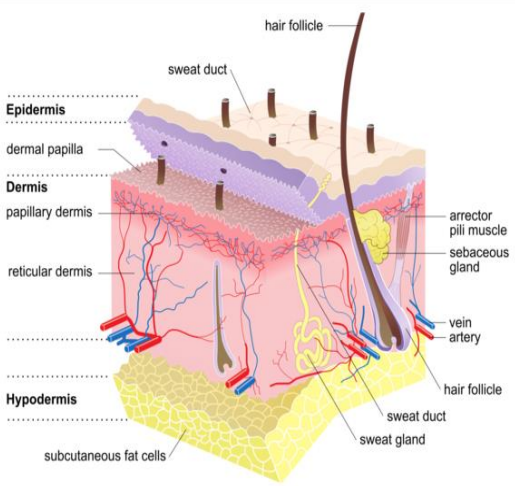

Fig. 2. The figure showing the different layers of skin and major component of dermal layer also.

Mast cells are present at the junction of epidermal and dermal layers, near the capillaries. They produce mucopolysaccharides, release histamine through lysosomes, and activate the repair function of the skin. The next layer dermis is the thick and fibrous layer. This layer provides structure to the membrane so that the membrane can cover the organs underneath and protect them from mechanical or other damage. The papillary layer is **the top layer of the dermis**. It is much thinner than the second layer reticular dermis. The ground substance (extracellular matrix) present is the material found around the cellular and fibrous components present. It contains aqueous gelled polysaccharides or mucopolysaccharides and has collagen fibres (strength) and glycoprotein, water, inorganic salts, and hormones. The cellular and fibrous components consist of collagen fibres, fibroblast cells (generate fibrous material), fat cells, blood vessels, nerve fibres, touch receptors (Meissner corpuscles), and phagocytic cells. The second reticular layer of the dermis has blood vessels and connective tissue supporting the skin. The connective tissue proteins collagen, elastin, and proteoglycans have distinct functions. Collagen is the rigid scaffold that covers the body. The three main types of collagen fibres are types I, II, and III. These molecules form the fibrous network of the cells known as fibroblasts. They are the connective tissues most found in animals and synthesize the extracellular matrix (ECM) and collagen. They have a vital role in the healing of wounds. Elastin is also a protein that provides elasticity and strength.[2,3,4] They cannot be classified further. They are linear elastic material that deforms. Hair follicles, oil and sweat glands, and other structures are also found in the reticular dermis. Proteoglycans participate in damage repair.

STRUCTURE OF HAIR

Hair grows from the dermis and begins in the follicle bulb. Languno hair (present at birth but falls out), vellus hair (all over the body), terminal hair (thicker and darker hair on the scalp), and bristle hair (beards) are the different types of hair. Specific cells from the superficial dermis multiply and protrude to form a "peg", under which there are specialised fibroblasts that will develop into the dermal papilla. The hair shaft is formed when epidermal cells neighbouring to

the dermal papilla start multiplying and force a column of keratinizing cells upwards towards the scalp surface. As the column lengthens, the hair 'peg' pushes downwards to form the follicle, the bulb like structure. The erector pili muscle to support hair and sebaceous glands are found in this portion. The highest rate of cell division is of the hair follicle in the human body and thus requires energy for proper growth.

The cuticle, which surrounds the cortex, is the outermost structure. The cuticle contains flat cells that overlap in a roof-tile pattern and are held together by an intercellular cement. Each cell has an outer membrane that contains three distinct layers: the A-layer, the exocuticle, and the endocuticle. The cortex, made up of elongated keratinized cells bound together with intercellular material, makes up most of the fibre mass. The cortex's two regions are: the paracortex, which is the dominant component, and the orthocortex, which is the minority component. The paracortex cells are protected by a sulphur-rich matrix with chemical cross-links, but the orthocortex cells are not.

Macrofibrils can be found in cortical cells. The length variation is caused by pigment granules and nuclear remnants. The macrofibril of width 0.1 pm to 0.4 pm, contains microfibril with a width of approximately 0.007 pm. A protofilament, a substructure with an estimated width of 0.002 pm, has been discovered within the microfibril. The basic and fundamental structure of the hair is thought to be three a-helix polypeptide chains.

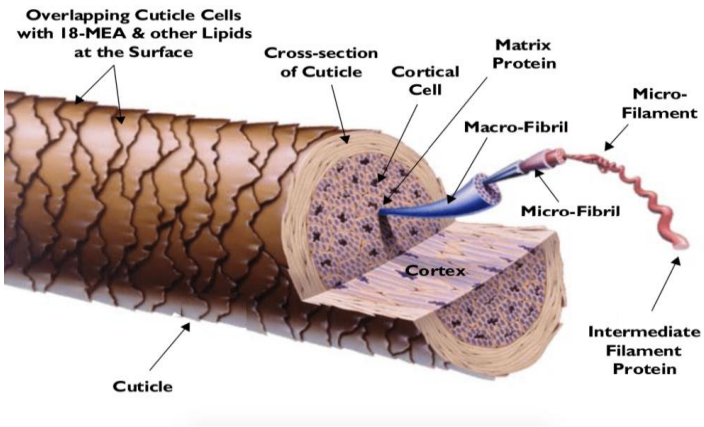

Fig.3: The structure of hair fibre with the different layers and sub structures.

Like skin hair fibres are also made up of complex protein keratin (85%) formed biochemically through the condensation of eighteen different types of amino acids. The other major components are lipids (3%), pigment (2%) and associated water (7%). The other component melanin is synthesised from the amino acid tyrosine. Trace amounts of some metals present, include aluminium, chromium, calcium, copper, iron, manganese, magnesium, and zinc. Phosphorus compounds are also abundant, primarily derived from degraded cortex cell nuclei.

Hair growth follows a cyclical pattern. All the follicles engage in this cyclic activity. The active growth or anagen phase, during which the hair is produced, is followed by a resting period known as the telogen phase. The fully formed or club hair remains fixed in the follicle by its expanded base in the latter period, and the dermal papilla is free of the epidermal matrix. The latter has been reduced to a minor secondary growth. The catagen stage occurs between the anagen and telogen stages, during which the newly formed club hair moves towards the skin surface. The duration of the anagen phase determines the terminal length of all hair fibres. At any given time, approximately 85% of scalp hairs are said to be in the anagen phase, while the remaining 12% and 3% are in the telogen and catagen phases, respectively. These

proportions are similar to those discovered in a study of the mechanical properties of scalp hairs from a single head. A scalp anagen phase can last up to three years.

Hair keratin can chemical react with alkali, acid causing its hydrolysis. The alkali hydrolysis cause release of individual amino acids and peptides. The hydrolysis by acid completely degrades the protein into its constituent amino acids. As a result, almost no material containing the peptide unit remains after completion. The reducing agents can reduce cystine, sulphur amino acid, to general thiol groups (—SH).

INTRODUCTION TO POLLUTION

According to WHO, Pollution is the introduction of contaminants or harmful materials into the natural environment that cause adverse change. Pollution is also known as an undesirable change in physical, chemical, and biological characteristics of Air, Water or Soil caused by excessive accumulation of pollutants. Pollutants, the components of pollution or harmful materials, it can be either foreign substances or energies or naturally occurring contaminants. Pollution can take the form of any substance or energy.

Air Pollution

The classification of air pollutants as defined by the Environmental Protection Agency (EPA) is into two broad classes based on the origin of the pollutants. The first class is primary pollutants are those which are emitted directly from sources and no chemical or physical change has taken place. An example would be the carbon monoxide emitted through the automobile exhaust. Such gases are called non-reactive since they generally do not interact with other gases, nor are they altered by solar radiation. The second class is of secondary pollutants formed in the atmosphere because of chemical reactions between primary pollutants and other species, like UV radiations released in the atmosphere. An example the reaction of VOCs and oxides of nitrogen react in presence of UV radiation leading to the formation of ozone.

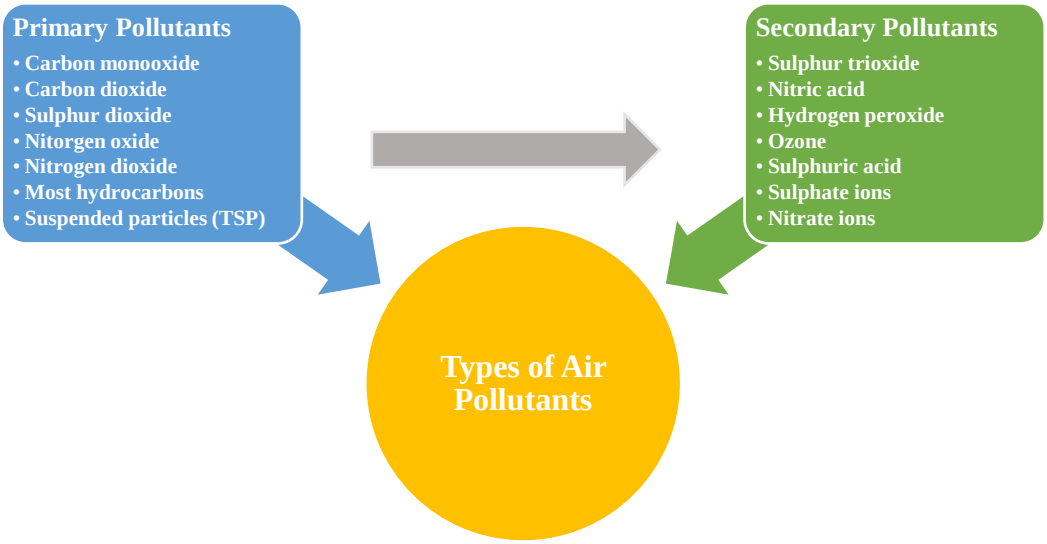

Fig.4: Classification of the air pollutants as a) Primary Pollutants b) Secondary Pollutants and relationship.

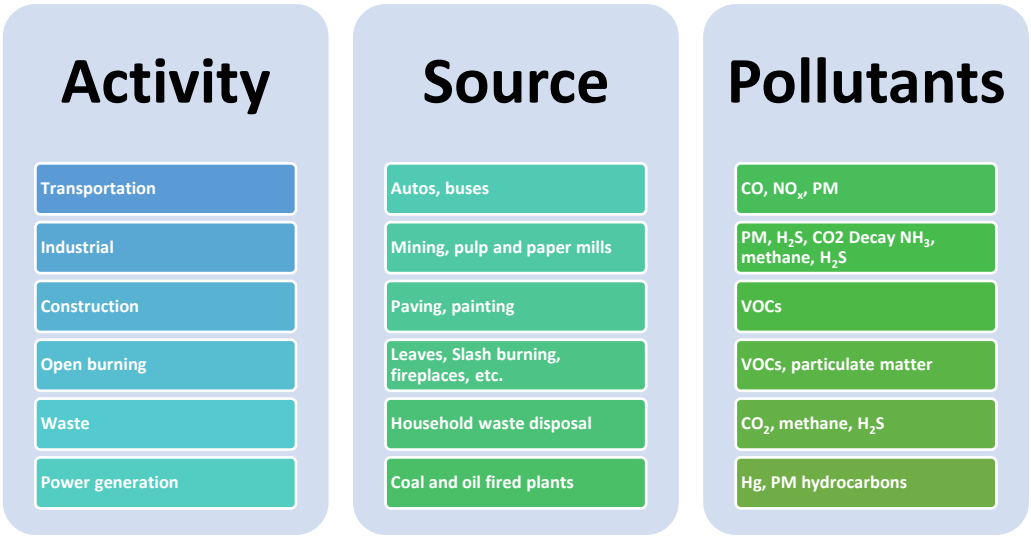

Fig.5: Anthropogenic activities causing air pollution, their sources, and the pollutants from the activity.

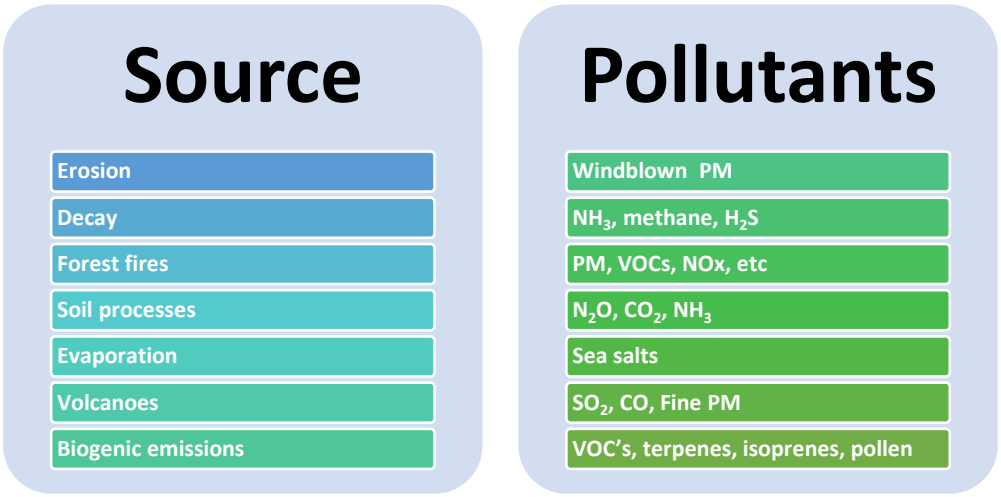

Fig.6: Natural sources causing air pollution with their respective pollutant

The other classification is based on the physical properties of the pollutant the first can be gas like carbon monoxide, ozone, oxides of nitrogen, and sulphur; the second can be particulate matter (PM), like carbon black, and heavier hydrocarbons. They are aerosols, which have both solid as well as liquid particles suspended in the air.

Another class of components known as aeroallergens are various antigens that are mostly airborne, having proteinaceous nature, which can cause allergic reactions. They can be generated from house dust, animals, drugs, food, pollens, drugs, fungal spores, and mite products. These products also include the antigens adsorbed and carried by inorganic or organic dust particles. Air pollutants can modify allergenic proteins, thus affecting their interactions with the immune system. Increased allergenicity was observed in several types of pollens when exposed to NO_2.

Water Pollution

Treated freshwater ecosystem which is mostly likely to come in contact of human skin when used for various day to day activities. This water contains chlorine used for treating water to make it fit for drinking, but this chlorine can damage the skin and hairs. Water can be polluted from both natural and human activities which can add pollutants to the water used for various purpose.

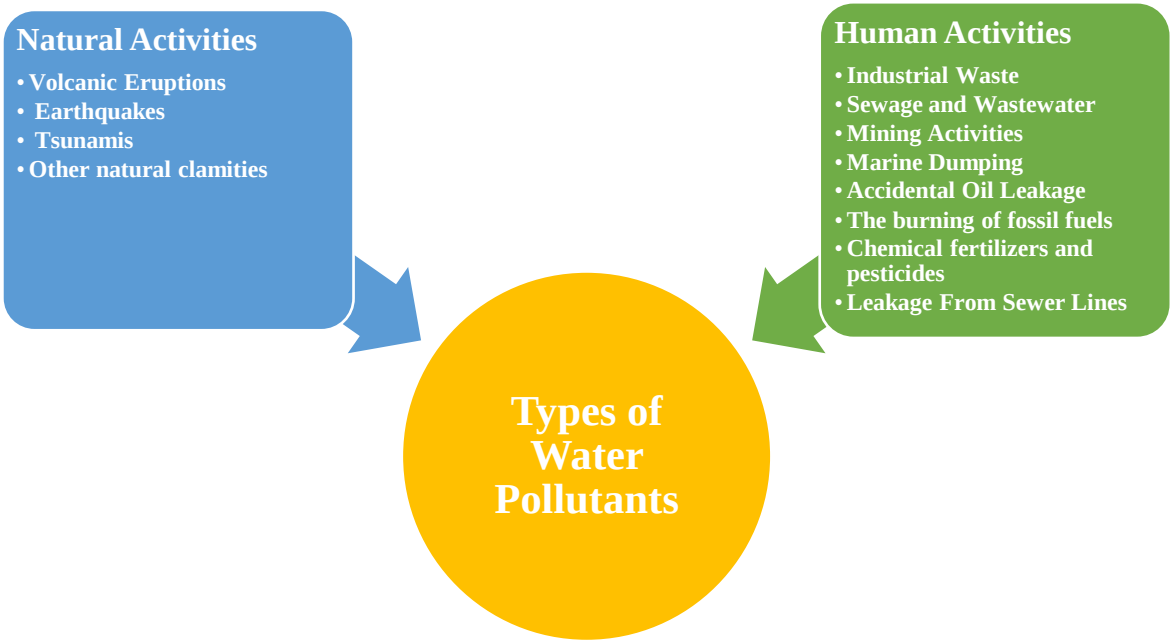

Fig.7: Natural activities and human activities causing water pollution with their source.

When fossil fuels like coal and oil are burned for various purpose, they emit a substantial amount of ash into the atmosphere. The toxic component from the ash when combine with the water vapours present in atmosphere may lead to acid rain. In many places the garbage collected from household garbage like glass, rubber, aluminium, paper, and food are collected and then are dumped into the sea. Some of these objects may require only 2 weeks to decompose but many may require many years which can even extend to two hundred years. Many dangerous chemicals like sulphur, asbestos, mercury, lead, nitrates, and others may be present in them. These toxic substances can even lead to the change in the colour of the water, to increase the amount of minerals present in the water (eutrophication), can cause change in the temperature of the water, which can present a serious threat to aquatic organisms thus leading to more pollution from excessive loss of aquatic life. The sewage and wastewater generated from households and other setups are treated and then released into the sea along with fresh water. The main pollutant from them can be pathogens, and chemicals that can lead to serious health issues and may be diseases.

Wind, floods, storms, and other activities like littering, can all cause garbage to enter various water sources. Mining activities can also produce a large amount of metal and sulphides waste from the rocks, which can be harmful to the environment. An exceedingly small leak in the sewer lines can also contaminate the underground water, rendering it unfit for human consumption. The contaminants can combine with rivers and canals through rain as they are washed from air and various surfaces and added to water sources.

The other important aspect is if water is contaminated it is tedious and costly affair to again make it usable by removing the pollutants. According to a data, approximately 80 per cent of wastewater generated through out the world is untreated.

EFFECT OF POLLUTANTS

Air and Water Pollutants' effect on skin

The pollutants cause dirt on the skin as they settle there, and some chemicals may even penetrate through skin layers to cause some of the effects discussed in detail later. This can lead to weakened barriers of the human skin and start inflammation. This weakened barrier can also lead to poor hydration of the skin. The presence of biomarkers in lesser amounts because of these components are also indicators of a weakened skin barrier. This can further lead to problems like the pigmentation of the skin, patches in the tones of the skin, its dullness, and wrinkle formation which may lead to premature skin aging.

The water pollutant many of which comes from the atmosphere also so have similar compositions, the other component the pathogens, toxic minerals, and dead and decaying matter are all in a larger amount and thus can cause a greater effect if encounter the skin. Further, these components are mostly in liquid form so the penetration through the epidermis and pores is more pronounced as compared to air pollutants.

Many other air pollutants like ultraviolet radiation, polycyclic aromatic hydrocarbons, VOCs (volatile organic compounds), oxides, particulate matter, ozone, and cigarette smoke affect the skin as they encounter it. These agents can stimulate oxidative stress thus leading to skin damage. Human skin has many mechanisms to protect against chemicals that are oxidative or physical air pollutants but extended or continuous exposure to the higher levels may cause many deleterious effects on the exposed human skin. Exposure to high-energy ultraviolet radiation is also related to skin aging and several types of skin cancers. The particulate matter (PM), a component of air pollution can cause severe damage to humans when skin exposed to is scientifically proven. It causes skin aging and affects dermal fibroblasts. The studies available have mostly worked on PM_{10}. When dermal fibroblasts are exposed to PM_{10}, the increased expression of inflammatory cytokines and fibroblast chemical mediators takes place. Thus, PM_{10} exposure caused skin inflammation as well as skin aging through impaired collagen synthesis mechanism.

The other component of cigarette smoke also plays a role in premature aging as well as increases the occurrence of problems like acne, skin cancer, allergic skin, and psoriasis. Polyaromatic hydrocarbons can also cause skin aging, pigmentation, cancers, and acneiform eruptions. VOCs (volatile organic compounds) have been associated with atopic dermatitis.
The continuous sun damage causes the effect on the secretion of ground substance in sufficient quantity by fibroblasts leading to reduced repair on time and making skin lax, wrinkled, and poor healing of the skin leading to signs of the process of aging. The upper dermal collagen patterns are disrupted and tangled, and their staining properties are altered. The entire skin, including the epidermis, is thinned, and many fibroblasts are lost. Because the dermis can no longer regenerate, old skin heals slowly.

Although, the healthy body generates Reactive Oxygen Species (ROS) daily as a normal body process. When the body is attacked by bacteria or any other foreign bodies, then the body's defensive immunity system will produce free radicals to provide a hostile environment to control them. These ROSs are also produced whenever the body is facing environmental insults in the form of UV radiation, smog, suspended drug particles, alcohol, and cigarette smoke. They disrupt and damage the lipids as well as the proteins present in the skin and thus reducing the body's natural antioxidants control mechanism and free radical

control mechanism which are in place. Antioxidants are there to neutralize the effect of free radicals and thus reduce their damaging effects. The photo-aging leading to changes in ECM is also the result of ROS causing changes in collagen and elastin. Thus, leading to the degeneration of collagen. They can also lead to the increase in the sebum production of the skin.

Finally, air pollutants can exist as solids, liquids, gases, or particulate matter. These are absorbed directly into the subcutaneous tissue via the skin, hair follicles, and sweat/sebaceous glands. Pollutants in the air harm the skin by increasing oxidative stress, which weakens the skin's antioxidant defences. Non-enzymatic (Vitamin E, Vitamin C, and glutathione) and enzymatic (glutathione peroxidase, superoxide dismutase) antioxidant capacity is depleted. Air pollutants cause severe changes in the normal functions of lipids, DNA, and proteins in the human skin through oxidative damage, resulting in extrinsic skin ageing, inflammatory or allergic conditions such as contact dermatitis, atopic dermatitis, psoriasis, acne, and skin cancer.

Similarly, water pollutant can also lead to acne and premature ageing, among other skin issues. It also has the potential to cause collagen damage, which can lead to hyperpigmentation and fine lines. It can also aggravate acne and rosacea by causing inflammation.

Air and Water Pollutants' effect on hair

Day in and day out, every where we are encountering the environmental conditions that are very much threating for the hair and scalp health. Air pollutants as discussed above includes from both natural and anthropogenic activities which can be harmful to the health and well-being of our scalp. The scalp can be subjected to the same stressors as the skin. Pollution causes sensitivity issues and may also cause discomfort which can be due dryness or excess oil secretion on the scalp. Excess sebum production on the scalp results in oily and greasy hair as well as roots which can block pores and thus hair follicles, which will in turn weaken hair root and hair breakage or its loss .

When exposed to pollution, such as gases, PM, or dust particles that contact the hair fibre and penetrate the superficial cuticle layer, the hair fibre can become dry and brittle over time. As a result of the constant exposure to environmental elements and external aggressors, the structure of the hair strands is damaged.

PM can bind to the hair surface and infiltrate the hair follicles despite being forty times smaller than the hair fibre. When these particulates fall on hair or scalp cells, they produce free radicals and oxidative stress. When these particulates matter come into contact with hair or scalp cells, they produce free radicals and oxidative stress, which causes severe cell damage. As a result, the ageing process is like that seen with chronic UV light exposure.

Pollution affects the status of skin and scalp cells and modifies superficial biochemical parameters such as sebum secretion, lipid peroxidation or protein carbonylation, antioxidant levels, barrier function, and ageing mechanisms such as DNA mutations, according to these studies.

COSMETICS AND THEIR ROLE IN CONTROLLING EFFECT OF POLLUTION

According to EU Regulation 1223/2009 , "Cosmetic product means any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nail, lips and external genital organs) or with the teeth and the mucous membranes of the oral cavity with the view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them , keeping them in good condition or correcting body odours".

Cosmetics are classified as either leave-on or rinse-off. A leave-on cosmetic is a product that is intended to stay on the skin for an extended period for its functions; examples include perfumes, decorative cosmetics, body and face creams, and antiperspirants. Shampoos, soaps, shower gels, and toothpastes are examples of rinse-off cosmetics that are designed to be rinsed off after a brief contact with the skin or mucous membranes. The dermal layer is responsible for most of the skin's health and beauty. The natural defence mechanism of human body macrophage mobile cells and leukocytes they attack invaders in damaged skin. The booster for them can also lead to less of the effect of the foreign invaders.

The ingredients may be included in cosmetic products depending on the skin type. For dry skin, ingredients such as oligopeptides, antioxidants, hyaluronic acid, vitamin B5, plant butters and essential oils, cucumber, and cilantro can be used. Similarly, for normal skin, pure hyaluronic acid or natural components containing activated charcoal, kaolin clay, glycolic acid, and vitamin C can be chosen. Niacinamide, activated charcoal, salicylic acid, mandelic acid, vitamin C, and calendula can be used to treat oily skin. Tea tree, menthol, sulphur retinol, vitamin C, and cinnamon bark extract for acne-prone skin. Retinol, vitamin C, vitamin E, ferulic acid, peptides, ginger leaf for ageing skin.

The primary function of our skin is to function as an immune barrier, and if pollutants have weakened this barrier, it is critical that it is restored. This can be accomplished by supplementing the skin with vitamins E, C, and B, as well as antioxidants. These help to heal free-radical-damaged skin and maintain a healthy immune barrier. Citrus fruits, beetroot, oregano, apples, avocado, blueberries, leafy greens, and beans all aid in the healing of the body, especially the skin.

Over 20 years of data and published research back up niacinamide's ability to restore and strengthen the skin's protective barrier, while also improving skin hydration and promoting skin surface exfoliation. Anti-aging products are to restore the regenerative/degenerative balance and increase collagen and elastin fibre synthesis. They also maintain the delicate balance between antioxidants and the body's Reactive Oxygen Species (ROS). Examples of topically applied substances that have the potential to help with balance include Retinol Alpha hydroxy acids (AHAs) vitamin A derivatives, Vitamin C will result in proper fibroblast function, increasing fibres' water-retaining capacity and increasing skin suppleness and firmness.

The newer research *ex vivo* data show that a pea (*Piscum sativum*) and chia (*Salvia hispanicum*) seed extract with the trademark name “ProcatalineTM G2 biofunctional” can reduce hair and scalp damage caused by air pollution. Ex vivo studies on scalp cells have shown that isolated hair follicles or 3D dermal papilla cells improve the scalp's antioxidant defence mechanism, hair follicle nutrition, and regeneration potential after exposure to major air pollutants. This improves scalp hydration and barrier function while also reducing sensitivity, redness, and desquamation. According to the company's data, “ProcatalineTM G2 biofunctional” chelates major heavy metals and reduces tryptophan degradation in hair fibre keratin, making the hair less susceptible to damage.

Our skin's primary function is to function as an immune barrier, and if pollutants have weakened this barrier, it is critical to strengthen it. This can be accomplished by fortifying the skin with essential vitamins like E, C, and B, as well as antioxidants. These aid in the healing of free-radical-damaged skin and the maintenance of a healthy immune barrier. Citrus fruits, beetroot, oregano, apples, avocado, blueberries, leafy greens, and beans all help the body heal itself, particularly the skin.

The conclusion from the above discussion is that the strategy involved should deep cleanse, give full protection, defend the invasion, and restore the proper functioning. The better understanding of the pollutants and mechanisms of their effect on the body has lead to develop

better products. Switching from chemicals to natural products with some inert part can help the achieve the aim effectively. The regimen to counter the effect of pollutants can be divided as follows-

1. Proper cleansing of hair or skin. For that making products leading to surface and deep pore cleansing and not affecting other functions of the part. They should also purify, rejuvenates, and give fresh feel.
2. The protection from ultra-violet radiations (UVA/UVB). The SPF containing product of natural origin. The product should also retain the moisture.
3. The use of antioxidants to fight free radicals and restore the balance.

DOSAGE FORMS COMMONLY FOUND IN COSMETICS

The Natural and Non-prescription Health Products Directorate (NNHPD) has identified the many dosage forms which are commonly found in cosmetic products. Some of the dosage forms which can be helpful to combat the effect of pollution are given below in table. The product description is also given to explain their use in reducing the effect.

Table.1: The dosage forms preferred for counteracting affect of pollution.

Name	Description
Astringent	Product that firms and tones the skin These products, commonly referred to as "toners," are typically applied after washing to condition skin prior to the application of other products, such as moisturisers. Lotion, topical liquid facial care products designed to remove make-up, dead skin cells, oil, and dirt from the skin of the face are commonly associated with the physical dosage forms.
Cleanser	Lotion, topical liquid facial care products designed to remove make-up, dead skin cells, oil, and dirt from the skin of the face are commonly associated with the physical dosage forms.
Conditioner	Emollient-containing preparation applied to the hair or skin. Cream, gel, and topical liquid are the most common physical dosage forms.
Exfoliant	A dosage form that is applied to the skin to remove dead skin cells. Cream, gel, and topical liquid are the most common physical dosage forms.
Lip balm	An occlusive layer is formed on the lip surface to seal moisture in the lips and protect them from external exposure. Physical dosage forms commonly associated with paste, stick
Masks	Product that is intended to dry or solidify on the face or to remain wet for a set period before being removed. Frequently associated with physical dosage forms: powder, paste

Moisturizer	A skin-hydrating and anti-drying preparation. Commonly associated physical dosage forms: cream, lotion.
Mousse	Preparation with a foaming (light and airy) texture designed to improve product dispersibility and spreadability. Available in both pressurised and non-pressurized containers.
Serum	A highly concentrated skin, nail, or hair products. Physical dosage forms commonly associated with concentrate, gel, and topical liquid.
Treatments	Preparation intended for a specific area's surface treatment (or aesthetic condition). This dosage form must be used with a qualifier, such as hair treatment, nail treatment, or skin treatment. Cream, paste, and topical liquid are the most common physical dosage forms.
Night Cream	A night cream is any product that is applied to the skin before going to bed and is left on while sleeping.
Shampoos	A product for cleansing hairs and may contain medicinal or nutrient component also.

NATURAL INGREDIENTS FOR HEALTHY SKIN AND HAIR

Many of us follow a strict beauty product to keep our skin, hair in good health. When it comes to beauty, importance should be given to natural ingredients rather than commercial beauty products. Chemicals and toxins in commercial products can do a lot of harm overall.

Table.2: List of Some of natural ingredients for healthy hair and skin their active constituents and effect on hair and skin.

Ingredient/ Botanical Source	Constituents present	Effect on Skin	Effect on Hair
Coconut oil	Rich in medium-chain triglycerides	Moisturizing property helps retain moisture in skin, which is important for soft and smooth skin, protects skin from sun damage, reduce inflammation and revitalizing the skin.	Easily penetrates deep into hair shafts, helps in hair growth,
Green tea	Higher antioxidants activity, Catechins having 5-alpha-reducetase inhibiting properties	Skin protection against UV damage, reduces premature aging like wrinkles, age spots and saggy skin.	On hair, the catechins help to block DHT (dihydrotestosterone), one of the key components of hair loss.

Lemons	Nutritional powerhouses rich source of vitamin C and antioxidant	On Skin boosts collagen production, restoring skin elasticity to maintain a smooth and youthful appearance.	For hair, lemon is effective in treating dandruff and scalp itchiness, balances the pH level of scalp and prevents scalp infection leading to hair growth.
Honey	Composed of fructose and glucose, contains proteins and amino acids, vitamins, enzymes, minerals	Emollient, humectants, soothing keeps the skin young and slows wrinkle formation; regulates pH level; and prevent pathogen infections.	Conditioning effects
Tomatoes	Water-rich and rich in lycopene, a powerful antioxidant that helps prevent or repair damage to DNA	Helps protect against sunburn exposure	Strengthen hair and promote hair growth by helping balance the pH level of our scalp, help treat dandruff
Almonds	High vitamin E content	Skin complexion, reduce the intensity of sun damage and make our skin healthy	Helps ward off damaging free radicals and even oxidative damage
Oatmeal	Rich in protein, biotin, and other B vitamins	Colloidal oatmeal can be used as a cleanser, moisturizer, buffer, as well as a soothing and protective anti-inflammatory agent	Oily and smelly hair, finely powdered oatmeal can be used as dry shampoo
Moringa	alkaloids, saponins, tannins, steroids, phenolic acids, glucosinolates, flavonoids, and terpenes,Vitamin A, Vitamin E, Vitamin C and Phenols, Fatty acids a high content of mono-saturated oleic acid (omega 9), Cytokinins, crypto-chlorogenic acid and isoquercetin as major active antioxidant, cytokinins	Cleanses and purifies skin, Prevents and minimize sunspots, moringa oil boosts collagen, helping reduce fine lines, wrinkles and sagging skin, antioxidants, antibacterial, and nourishing properties anti-aging weapon, and the fatty acid's deep moisturizing properties. helps in blackheads and pimples and minimizes dark spots, and its anti-inflammatory properties. Hyaluronic acid plumps skin and maintains hydration levels	Softens, shines, and repairs split ends and cuticles. It combats dryness, caused by over-exposure to heat and cleansing products while replenishing skin's moisture and maintaining optimal hydration levels.

Har Singar	Leaves of Harsingar contains benzoic acid, fructose, glucose, carotene, amorphous resin, ascorbic acid, methyl salicylate, tannic acid, oleanolic acid and flavanol glycosides. Flowers are greatly beneficial as it contains essential oils and glycosides. Seeds contain palmitic, oleic and myristic acids.	-	-
Palash	Fixed oil (Fatty acid: linoleic acid, oleic acid, linolenic acid, palmitic acid, stearic acid, arachidic acid, behinic acid and linoceric acid). Alkaloid (monospermine), Palasonin and palasonin-N- phenyl imide. Flowers: Butrin, butein, Flavonoids, steroids. Coreopsin, Isocoreopsin, Sulphurein, Monospermoside and isospermoside,	It is used to manage skin problems of skin like acne and pimples. Astringent nature.	-
Hibiscus	Component- Beta keratin, vitamin-C, Anthocyanin Malic acid and citric acid	Protects with antioxidants Natural collagen production It may spit up wound healing Glowing skin	Protects with antioxidants
Marigold	Component- Flavonoids, patuletin, Quercetagetin, Quercetin	Treat chronic skin diseases , Slow aging help acne, moisturizes, reduce inflammation	-
Rosa alba	Alba Chemical constituents: citronellol, geraniol, nerol, citral, carvacrol, eugenol, Chemical constituents: citronellol, geraniol, nerol, citral, carvacrol, eugenol	Protects with antioxidants	Protects with antioxidants

Henna	Lawsone, paraphenylenediamine	Henna leaves are available in powder form. It should be of a dull green colour. Henna leaves a reddish brown colour imprint when applied to the skin.	Henna is also a powerful natural cleanser. It cleanses without disturbing the natural balances. This is one of its greatest benefits. It leaves the hair healthy, clean, shiny, and easy to manage. The advantage of using henna is that it is safe because it does not have any side effect. It acts as nature's own hair conditioner.

Table.3: List of some of natural ingredients (fruits and vegetables) for healthy hair and skin

Carrots Carrots Full of antioxidant Vitamins A, C and E; contain elevated levels of beta-carotene which promotes healthy digestion and protects against cancer; cleanses the liver and the blood.
Sweet Potato Packed full of beta-carotene and vitamin C, rich in fiber. Apricots High levels of beta-carotene, which the body turns into Vitamin A.
Squash Good source of beta-carotene and Vitamin C.
Broccoli High in antioxidants including Vitamin C and the Vitamin A precursor beta-carotene; a good source of fiber.
Citrus fruit Oranges, lemons and grapefruits are all high in vitamin C and other antioxidants.
Apple Apples have been found to have strong antioxidant activity.
Other ingredients that help keep skin nourished and moisturised from the inside include grains like millet (rich in mineral salt and silicon, which mends and aids elimination of toxins) and quinoa (high in protein and essential minerals); the essential fatty acids found in oily fish like mackerel and sardines, and in the oil and seeds of flax, pumpkin, almonds and hemp.
NATURAL MOISTURISERS There are lots of good natural alternatives in the form of vegetable-based oils that can nourish and protect your skin. When choosing natural products or if you just want to make your own moisturiser from natural oils, look for these ingredients. Almond oil • Grapeseed oil • Aloe vera • Hemp seed oil • Apricot kernel oil • Honey • Avocado oil • Jojoba • Beeswax • Macadamia nut oil • Castor oil • Mango butter • Cocoa butter • Olive oil • Coconut oil • Rosa mosqueta oil • Emu oil • Shea butter • Evening primrose oil • Squalene • Glycerine • Wheat germ oil

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