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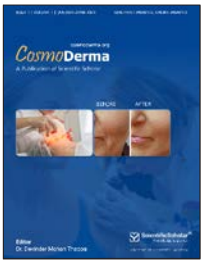

Looking Back in History

History of sunscreen

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INTRODUCTION

Sunscreen has become an important component of our skincare regimen to protect us from ultraviolet (UV) radiation. With the discovery of UV radiation, various experiments were conducted to study the harmful effects of UV radiation on human skin. This has led to the discovery of the first sunscreen in the year 1928. The sunscreen market has expanded drastically over the past two decades adding various ingredients and technologies to their product and claiming it to be broad-spectrum, water-resistant, noncomedogenic, paraben-free, fragrance-free, and mineral added with various sun protection factor (SPF) ranges and UVA star ratings. The advancement in the sunscreen industry made us wonder where the idea of photoprotection began. So, we looked back into history to have a better understanding of sunscreen ingredients and provide better recommendations to patients seeking advice on sun protection.

History of sunscreen:

4000 BC: Egyptians were the first civilization to use the extracts of rice bran, jasmine, and lupine to block the tanning effect of the sun where rice absorbs UV light, jasmine repairs DNA, and lupine lightens the skin.[1] The lighter skin was cosmetically and culturally desirable by then.

800–500 BC: The Greeks protected their skin with a mixture of olive oil and sand while training under the sun for Olympic games.[1] Later olive oil was confirmed to have an SPF rating of 8.

500 BC: In *'Charaka Samhita'*, an ancient Indian medical literature, the pushpanjan (Zinc oxide) was discovered which is employed in physical sunscreens nowadays.[2]

1600: Fair skin was given importance among the upper-class females. The women covered their face with uncomfortable visards to protect it from sunlight.[3]

1798: Robert Willan described a skin condition, *eczema solare*, abnormal skin sensitivity to sunlight.[4]

1801: Johan Wilhelm Ritter first discovered UV radiation.[4]

1820: Sir Everard Home discovered the role of sunlight in skin burn. He proposed that a component of sunlight, not heat caused a "scorched pigmentation" on the exposed skin.[4]

1878: In Austria, Otta Veiel has discovered the effect of tannins in sun protection.[5]

1889: Erik Johan Widmark, experimentally proved that UV radiation can cause skin erythema and burns.[4]

1891: The first chemical sunscreen was formulated by Friedrich Hammer, Germany, using acidified quinine sulphate in lotion and ointment which reduced the UVB-induced sunburn effect.[4]

1896: An association between skin carcinoma and sunlight was first described by a German Physicist, Dr. Paul Unna.[6]

1910: Dr. Unna developed a sunscreen from a chestnut oil and marketed it in the name of "*Zeozon*" and *"Ultrazeozon."*[6]

1920: The idea of "*sun bathing*" and tanning became popular in Western culture after Coco Chanel's famous photographs were taken on a Mediterranean cruise. The tanned skin became a sign of health and privileged life.[7]

1928: The two German Scientists, Hausser and Vahle, created the first commercially available sunscreen which contained benzyl salicylate and benzyl cinnamate which absorbed UVB effectively.[8]

1935: Eugene Schueller, the founder of L'Oreal, formulated a tanning oil and named it "*Ambre solaire*" which contained benzyl salicylate and para-amino benzoic acid (PABA).[9]

1938: Swiss chemist Franz Greiter gets sunburned while climbing Mt. Piz Buin which inspired him to create the first modern sunscreen a decade later.[1]

1942: In a "top-secret experiment" done by the American Medical Association Council of Pharmacy and Chemistry to prevent sunburn in airmen, they find that dark red veterinary petroleum is the ingredient that possessed the qualities of waterproof, inexpensive, and free of toxicity.[4]

1944: Benjamin Green, a pharmacist, developed Coppertone suntan lotion, a more consumer-friendly formulation.[10]

1946: Grieter commercializes the first modern sunscreen in the name, "*Gletscher Crème*" or Glacier Cream.[9]

1956: Many dermatologists around the world started reporting allergic reactions to PABA containing sunscreen and PABA was considered to be photolabile.[8]

1956: Rudolf Schulze, a German physicist, proposed a testing method to determine the protective factor of a sunscreen which was later improvised by Franz Greiter.[8]

1965: PABA was steadily withdrawn from the market and most of the formulators started labeling their sunscreen *"PABA-free."*[8]

1969: Albert Kligman, American Dermatologist, described the structural damage to the skin due to sun exposure and coined the term *"Photoagaing."*[11]

1974: Grieter coined the term "*Sun protection factor*".[8] SPF is the ratio of the UV radiation required to produce barely perceptible erythema in a sunscreen-protected skin to the UV radiation required to produce the same in unprotected skin.

1978: The US Food and Drug Administration (FDA) adopted SPF to measure the efficacy of sunscreen and regulated the booming sunscreen market.[1]

1980: The first long UVA filter, Avobenzone, came into the sunscreen market.

1990: Most sunscreens in the market were SPF 15–30. Avobenzone was the most common ingredient for UVA protection and octyl methoxycinnamate was the most common ingredient for UVB protection in sunscreens.[1]

1991: A study looked into the transmission of UVA and visible light through an opaque layer of zinc oxide containing sunscreen. Regardless of the thickness of the sunscreen, the transmission of the visible light was not blocked. But adding iron oxide significantly reduced the transmission of sunscreen.[12]

1992: Professor Brian Diffey along with the scientists at Boots, developed a UVA star rating system. If the UVA protection is above 1/3 of the UVB protection, a symbol with UVA in a circle may be used on the packaging.[8]

2007: The International Agency for Research on Cancer published a study confirming the association between tanning beds and melanoma.[13]

2008: A study reported the occurrence of coral bleaching due to sunscreen ingredients in the regions of higher human recreation.[14]

2014: Sunscreen innovation act was passed by Congress which required the FDA to review new applications of active sunscreen ingredients in 300 days.

2018: In Hawaii, octinoxate and oxybenzone were banned due to coral bleaching as most of the sunscreens had these two chemicals as an active ingredient.[15]

2019: Matta and colleagues studied the plasma concentrations of four commonly available sunscreens (avobenzone, oxybenzone, octocrylene, and ecamsule) that exceeded the level established by the FDA.[16]

2019: Sunburn alert stickers came into use which indicates when it is time to re-apply the sunscreen.

2020: Colourescience brush-on shield, the only powdered sunscreen, recommended by the skin cancer foundation for active use. It was recommended to use alone or over make-up with one application alone.[17]

From natural ingredients like jasmine, rice, and olive oil to the most advanced formulations with various chemical and mineral ingredients, sunscreen has evolved with the increased awareness in sun protection to avoid sunburns, skin cancers, and photo-aging.

The attitude of present-day parents towards photoprotection in their children has improved in the past decade that they

Table 1: List of FDA approved sunscreen ingredients.[20]

FDA proposed order	FDA deemed final order (DFO)
GRASE*:	GRASE:
1. Zinc oxide	1. Aminobenzoic acid
2. Titanium dioxide	2. Avobenzone
NON-GRASE:	3. Cinoxate
1. Para-amino benzoic acid (PABA)	4. Dioxybenzone
2. Trolamine salicylate	5. Homosalate
Insufficient safety data:	6. Meradimate
1. Cinoxate	7. Octocrylene
2. Dioxybenzone	8. Octinoxate
3. Ensulizole	9. Octisalate
4. Homosalate	10. Oxybenzone
5. Meradimate	11. Padimate O
6. Octinoxate	12. Ensulizole
7. Octisalate	13. Sulisobenzone
8. Octocrylene	14. Titanium dioxide
9. Padimate O	15. Trolamine salicylate
10. Sulisobenzone	16. Zinc oxide
11. Oxybenzone	
12. Avobenzone	

*GRASE- Generally recognized as safe and effective

systematically use hats, sunglasses, protective clothing along with high protection sunscreen.[18] FDA recommended not using sunscreen in infants less than 6 months and keeping them away from direct sunlight. For older children, FDA suggested using a mineral-based sunscreen to avoid irritation due to chemical sunscreen.

FDA recommends that consumers check the sunscreen label for broad-spectrum (to protect the skin against both UVA and UVB) and an SPF not lesser than 15. UVA protection factor must be at least 1/3rd of the labeled SPF and critical wavelength should be more than 370nm for the sunscreen to provide effective UVA protection. FDA regulates the sunscreen to ensure that they are safe and effective and deemed the sunscreen containing specified 16 ingredients GRASE (generally recognized as safe and effective)[19] [Table 1].

CONCLUSION

In light of these recent discoveries, dermatologists must be able to recommend a sunscreen suitable for their patients. It is our duty to educate the patients that in addition to using sunscreen, they must resort to other sun protection measures like seeking shade when the sun rays are stronger between 10 am to 2 pm, wearing protective clothing like lightweight and a long-sleeved shirt, wide-brimmed hat and wear sunglasses for the optimal effect because no sunscreen provides 100% protection.

Declaration of patient consent

Patient's consent is not required as there are no patients in this study.

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Conflict of interest

There are no conflicts of interest.

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