International Journal of Research in Dermatology
*Ghalla M et al. Int J Res Dermatol. 2022 Jan;8(1):168-174*
http://www.ijord.com

DOI: https://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20214928

**Review Article**

# Expert consensus on the use of sunscreen agents: Indian perspective

**Mansukh Ghalla[1], Rasya Dixit[2], K. Srinivasa Murthy[3], Tina Priscilla Katta[4]***

[1]Dermatree Skin and Hair Clinic, Mumbai, Maharashtra, India
[2]Cosmetic Dermatology Clinic, Bangalore, Karnataka, India
[3]Skin & Cosmetology Centre, Bangalore, Karnataka, India
[4]Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad, Telangana, India

**Received:** 15 June 2021
**Accepted:** 31 July 2021

***Correspondence:**
Dr. Tina Priscilla Katta,
E-mail: drtinak@yahoo.com



## ABSTRACT

Sunscreens have been widely known to play an integral part in photoprotection. Both physical and chemical sunscreens have been extensively used for prevention and management of several conditions induced by ultraviolet rays such as sunburn, photoaging, skin cancer, and phototoxic reactions. Currently, sunscreens are available in different formulations like creams, lotions, gels, sticks, and sprays. Forty experts in the field of clinical dermatology participated in the expert group meetings organized via teleconference webinar to discuss definitions, diagnoses, and management. Current evidence on the use of sunscreen agents along with clinical experience of experts was discussed. The application of an adequate amount of sunscreen with an appropriate sun protection factor is imperative, and must be in accordance to skin type and exposure pattern of an individual. As part of a complete sun protection regimen, the judicious use of sunscreens must be combined with avoidance of midday sun exposure and protective clothing. There is an undeniable need to improve public education and awareness regarding use of sunscreens. This review article provides a consensus clinical viewpoint of expert dermatologists on effective use of sunscreens to assist in clinical decision-making for healthcare professionals.

**Keywords:** Sunscreen, Sun protection factor, Photostability, Photoprotection

## INTRODUCTION

Recurrent exposure of the skin to the sun could result in short-term as well as long-term changes in the structure of the skin.1 In short term effects, repeated exposure leads to erythema, whereas repeated exposure in the long term could cause irreversible loss of skin elasticity and development of melanomas and non-melanomas.[1] Photoprotective agents like sunblocks or sunscreens prevent and reduce the damaging effects of ultraviolet (UV) light.[2]

The use of sunscreens for protection against damaging effects of sun rays has been on the rise since years.[1] They have been widely used for their photoprotective properties, including prevention of photocarcinogenesis and photoaging, as well as for the management of photodermatoses.[3] Ideal sunscreens must have highly efficient filters against both UVB and UVA radiation. They must be photostable and must be available in formulations that are cosmetically acceptable.[3] They should also be free of adverse effects.[3] Consensus and expert opinion on the use of sunscreens in the Indian setting, and their benefits in photoprotection are lacking.

Expert group meetings involving 40 dermatologists from various cities across India were organized via teleconference webinars in the month of September 2020. Current evidence on the use of sunscreen agents along with clinical experience of experts was discussed. Numerous clinical insights were drawn from the focus group discussion based on the experts' views. All the

opinions were collated in a consensus document, that was developed and finalized after approval from all experts.

A literature search was performed using the databases PubMed and Google Scholar. Relevant articles were identified using the keywords sunscreen, sun protection factor, photostability, and photoprotection. After screening, 49 suitable articles were identified and collated as evidence-based literature on the use of sunscreens to support the experts' views and suggestions.

## AN OVERVIEW ON SUNSCREENS

Sunscreens have been well established and documented as effective photoprotective agents for preventing adverse outcomes of exposure to sunlight.[3] UVA imposes the risk of skin aging, dryness, dermatological photosensitivity, and skin cancer, whereas UVB can directly damage DNA, leading to mutation and cancer.[4] Sunscreens play a critical role in reducing the incidence of human skin disorders induced by UV rays.[4]

### *Classification of sunscreens*

Sunscreens are categorized as topical or systemic agents.[4] Topical agents are further classified as having inorganic or organic UV filters, based on specific mechanisms of action upon exposure to sunlight (Figure 1).[4] Organic sunscreens (chemical sunscreens) comprise of UVA and UVB blockers.[5] UVB filters absorb the entire spectrum of UVB radiation (290 to 320 nm), whereas UVA filters cover UVA I (340 to 400 nm) or UVA II (320 to 340 nm) radiation.[5] Broad-spectrum sunscreens absorb UV radiation from both the UVA and UVB spectra, thereby covering the entire spectrum (290-400 nm).[1,5]

Inorganic blockers protect the skin from direct contact with sunlight by reflecting or scattering UV radiation over a broad spectrum.[4] Hybrid UV filters are constituted of organic components mixed with inorganic components at the molecular or nanoscale level.[4] The combination enables creation of ideal materials with a large spectrum, high chemical, electrochemical and optical transparency; as well as magnetic and electronic properties.[4] Lastly, systemic sunscreens are absorbed into the body and accumulate in the skin affording protection from UV rays.[1]

### *SPF and PFA values*

The efficacy of a sunscreen is usually expressed in terms of the sun protection factor (SPF).[6] It is defined as the UV energy needed for producing a minimal erythema dose (MED) on protected skin, divided by the UV energy needed for producing a MED on unprotected skin.[6] MED is described as the lowest time interval or dosage of UV light irradiation necessary for producing a minimal, perceptible erythema on unprotected skin.[6] The higher the SPF, higher is the protection offered by a sunscreen against sunburns.[6]

SPF = MED on protected skin/MED on unprotected skin.[2]

Sunscreen products are also graded based on the photoprotection factor of UVA (PFA) value.[2] The method of testing PFA has been described as the amount of product to be applied, dose of radiation, and radiation field.[2]

PFA = Minimal persistent pigment darkening (MPPD) of protected skin/MPPD of unprotected skin.[2]

If the PFA is ≥and <4, the protection level is low and is labelled as PA+.2 If the PFA is ≥4 and <8, the protection level is moderate and is labelled as PA++.2 If the PFA is ≥8 or more, the protection level is high and is labelled as PA+++.2

### *Critical wavelength*

Critical wavelength is defined as the wavelength below which 90% of the UV absorbency of a sunscreen as measured in the band region 290-400 nm occurs.[7] Sunscreens offering chiefly UVB protection would have a critical wavelength >320 nm, while those providing both UVB and UVA protection would have critical wavelengths between 320 and 400 nm.[8] The Food and Drug Administration (FDA) necessitates that sunscreen products must have a mean critical wavelength of ≥370 nm to be labeled as providing "broad spectrum" UVA and UVB protection.[8] A broad-spectrum sunscreen can be defined as a sunscreen with critical wavelength >370 nm and PFA >4.9.

### *Boots star rating system*

An in vitro measurement of the ratio of a product's UVA (320-400 nm) absorbance over its UVB (290-320 nm) absorbance is used to calculate its Boots star rating.[9] A higher boots star rating is seen with products having better UVA absorbance.[9]

### *Common indications for using sunscreen in clinical practice*

The common indications for using sunscreens in dermatology are prevention and management of conditions like sunburn, freckling, discoloration, photoaging, skin cancer, phototoxic/photoallergic reactions, photosensitivity diseases, polymorphic light eruption (PMLE), solar urticaria, chronic actinic dermatitis, persistent light reaction, lupus erythematosus, xeroderma pigmentosum, albinism, photo-aggravated dermatoses, and post-inflammatory hyperpigmentation (PIH).[9]

## RECOMMENDED SPF FOR SUNSCREENS

The grading system for SPF ranges from low to high (low: SPF 2-15; medium: SPF 15-30; high: SPF 30-50,

and highest: SPF >50).[1] Sunscreens with an SPF of ≥30 that include photostable UVA filters are generally ideal.[2] Using sunscreens with SPF >30 during the summer and on sunny days is recommended.[1] Consumers typically apply sunscreens unevenly and in amounts lesser than recommended, thus decreasing the actual SPF.[10] High-SPF sunscreens might offer more adequate protection even when applied in inadequate amounts.[10] Individuals practicing outdoor sports like swimming and hiking experience considerably higher exposure to UV radiation exceeding recommended exposure limits, and are at a higher risk of skin cancer.[11] Athletes exposed to UV radiation must be encouraged to use broad-spectrum, water-resistant sunscreen of at least SPF 30-50.[12]

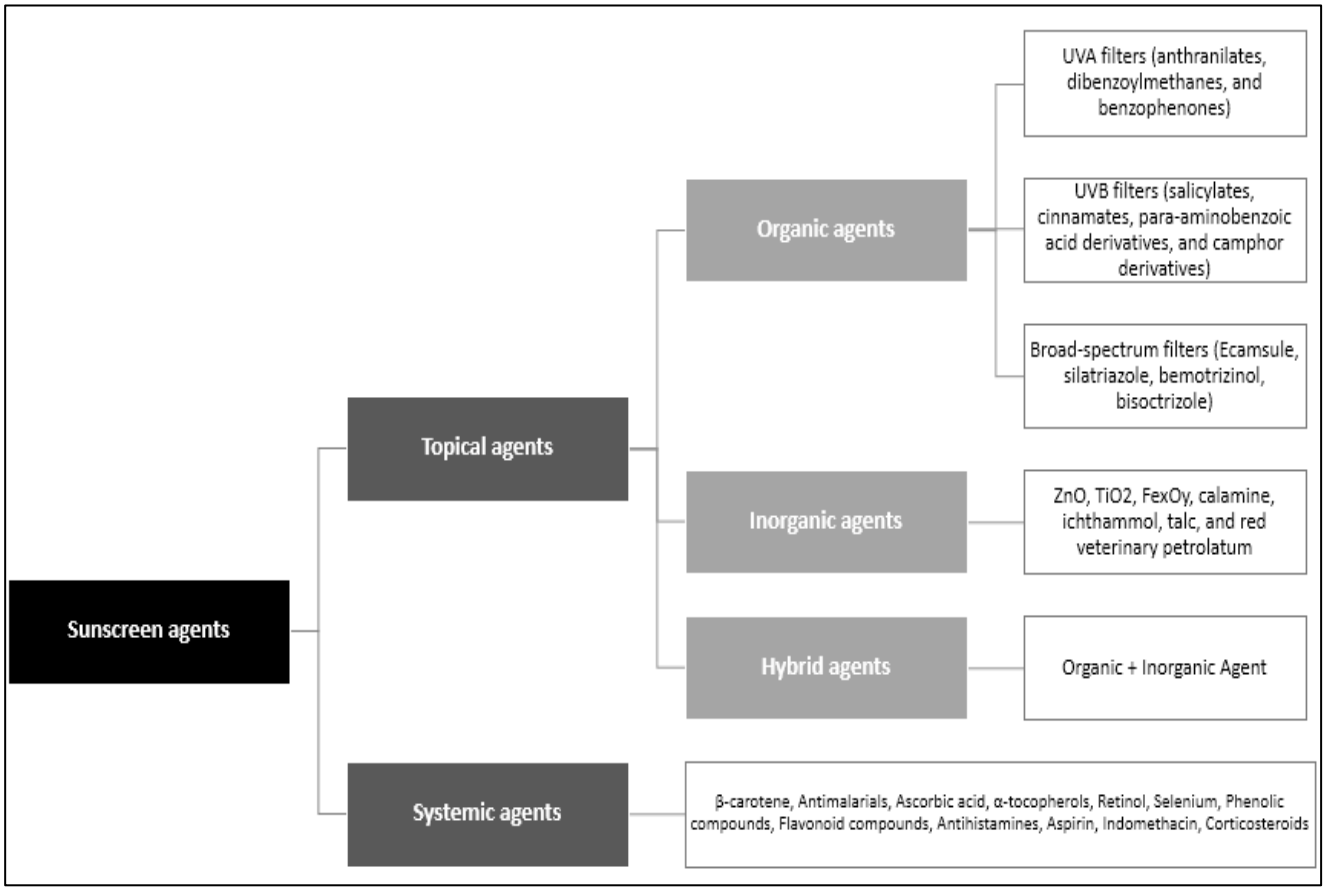


**Figure 1: Classification of sunscreen agents (Adapted from Ngoc *et al* Cosmetics. 2019;6(4):64).**

In certain conditions, higher SPF might be essential. For instance, patients with cutaneous lupus erythematosus (CLE) must apply adequate amounts of sunscreen with SPF of ≥50, half an hour prior to expected exposure.[13] Evidence also suggests that individuals with existing PIH using a sunscreen with SPF 60 exhibited greater improvements in overall skin lightening and number of macules, compared with individuals using sunscreen with SPF 30.[14] Sunscreen use can improve outcomes in PIH, and sunscreens with higher SPF might be more effective.[14] In photosensitive patients, an optimal sunscreen would have an SPF of no less than 50.[15] For people of color, broad-spectrum sunscreens with SPF ≥30, especially, those containing inorganic filters are better suited.16 A study by Lakhdar et al established the efficacy of regular application of a broad-spectrum SPF 50+ sunscreen by pregnant women.[14] Only 2.7% new cases of melasma were seen versus 53% cases observed in a previous study performed by the same investigators under similar conditions.[14] Additionally, 8 of 12 participants with preexisting melasma saw marked improvement.[14] For people living at high altitudes and having prolonged exposure to UV radiation, liberal use of broad-spectrum sunscreen with SPF>30, at least 20 min before going out in the sun, should be the norm.[17]

## RECOMMENDED AMOUNT OF SUNSCREEN FOR APPLICATION AND REAPPLICATION

A sunscreen must be applied properly to all sun exposed areas at a concentration of 2 mg/cm2. It must be allowed to dry completely before sun exposure.[2] The teaspoon rule of applying sunscreen as proposed by Schneider et al states that 33 mL would be applied to the entire body if 3 mL (slightly more than half a teaspoon) was applied to each arm and to the face and neck and if 6 mL (slightly more than a teaspoon) was applied to each leg, to the chest and abdomen, and to the back.[18] Described in a simpler way, sunscreen can be applied to each of the 11 body areas (rule of nines) at a dose of 2 mg/cm2 if two strips of sunscreen are squeezed out on to both the index and middle fingers from the palmar crease to the

fingertips.[19] The application of "two fingers" of sunscreen will ensure that users are protected according to their expectations.

Evidence suggests that for indoor workers who apply adequate amount of sunscreen once in the morning, reapplication might not be needed.[21]

***Patients/conditions and preference of sunscreens***

Sunscreens are commonly available in various formulations like creams, lotions, gels, ointments, pastes, oils, sticks, and sprays.[2] Choosing the most adequate galenic form of a sunscreen must be based on the characteristics of the patient concerning manner of use and area of application.[22] Cream-based or stick-based sunscreens are primarily favorable for children from 6 months to 2 years of age.[22] Gel-based or spray sunscreens are preferred in patients with oily skin and acne.[2] Gel-based sunscreens are less greasy compared to oil-based sunscreens, but are more easily removed by sweat or water.[23] Spray formulations are convenient, but are often difficult to apply evenly and might leave a film.[23]

Novel sunscreens with microfine particles have been established to be efficacious and safe in acne and rosacea.2 Sprays are good for protecting the scalp.[23] Evidence suggests that applying a lipstick sunscreen helps in increasing lip hydration.[24] Additionally, cosmetics like foundation makeup, help provide an everyday protection with SPF ranging from 4 to 30.[23] Currently, sunscreens with variable SPF are incorporated in moisturizers, providing additional sun protection.[25] Cinnamates, titanium dioxide, and zinc oxide have replaced the toxic para-aminobenzoic acid (PABA) agents.[25]

## PHYSICAL AND CHEMICAL SUNSCREENS

Chemical sunscreens absorb high-energy UV rays, whereas physical sunscreens reflect or scatter light.[2] Physical sunscreens contain zinc oxide and titanium dioxide.[5] Chemical sunscreens like octisalate and avobenzone provide better aesthetics upon application, and are therefore more widely accepted.[1] However, they have the potential for systemic absorption, subsequent sensitivity, and untoward effects.[1]

On the other hand, physical sunscreens are relatively inert, safe, stable, and non-irritating.[26] They have minimum potential for allergic sensitization, have high photostability, and are specifically beneficial for patients with sensitive skin, who cannot tolerate chemical sunscreens.[1,26] Metal oxides deliver photoprotection to patients with visible light and UVA photosensitivity like those with porphyria, drug photoallergy, and PMLE.[26] Nevertheless, their reflective properties might cause excessive shine and a whitish aspect, restraining their exclusive use due to low cosmetic acceptance.[1] Interestingly, the synergy between organic and inorganic sunscreens has been established, and superior efficacy of products comprising both compared to those containing either organic or inorganic sunscreens has been demonstrated.[1]

## WATER-RESISTANT ATTRIBUTE IN A SUNSCREEN

A water-resistant sunscreen is one which maintains the label SPF value after two sequential immersions in water for 20 min (total 40 min). A very water-resistant sunscreen is one which maintains the label SPF value after four sequential immersions in water for 20 min (total 80 min).[9] Water-resistant sunscreens must be applied in conditions in which there is substantial sweating, water immersion, increased skin friction via physical contact, or contact with sand.[27]

## PHOTOSTABILITY OF SUNSCREENS

Sunscreens are formulated to attain maximum efficacy that incorporates measures to support and promote photostability because all organic UV filters might potentially photodegrade.[28] Evidence depicts a reduction in SPF of 38% and 41% after 4 hours and of 55% and 58% after 8 hours of application of organic and inorganic sunscreens, respectively, in participants who over the course of eight hours performed physical activities, were then exposed to a hot environment, and finally bathed.[2] Hence, it is obligatory to apply the adequate and recommended amount of sunscreen to derive the claimed benefit.[2]

## USE OF SUNSCREENS FOR SPECIFIC PATIENT GROUPS AND CONDITIONS

***Infants and children***

Application of sunscreens should be a part of an overall sun protection strategy that includes avoidance of exposure to midday sun and use of protective clothing.[29] Oil-based emulsions containing inorganic filters seem to be the safest sunscreens for children.[29] However, certain organic filters need to be added to achieve an SPF of 50.[29] Oxybenzone and octocrylene must be avoided in sunscreens for children.[29] Regular use of sunscreens during childhood and adolescence could also significantly diminish lifetime risk of skin cancer.[30] The use of sunscreens is not recommended for infants younger than 6 months.[9]

***Preventing skin damage/aging/wrinkles in the elderly***

Photoprotection inclusive of sunscreens helps to prevent skin aging including wrinkles, sagging skin, or age spots.[31] Sunscreens permeate through the skin and absorb UVA rays before they can reach and damage the dermal layer.[31]

***Sunburns and photodermatoses***

Sunscreens are most useful in sunburn prevention.[7] Broad spectrum UVB/UVA protection and regular application in sufficient amounts are necessary.[7] Topical application of broad-spectrum sunscreens with SPF>30 is usually the appropriate choice for adequate photoprotection in photodermatoses like PMLE, and phototoxic dermatitis.[32,33]

Furthermore, corticosteroids, nonsteroidal anti-inflammatory drugs, antioxidants, and antihistamines have been evaluated for enabling the reduced production or diminishing the effects of various mediators in a sunburn reaction.[34] Numerous topical treatments like emollients, cool compresses, and topical anesthetics have been recommended for symptomatic treatment of sunburn.[34]

***Melasma and post-inflammatory hyperpigmentation***

A broad-spectrum sunscreen covering UVA, UVB, and visible light could play an adjuvant role in therapy for melasma and PIH by preventing exacerbations of hyperpigmentation and improving appearance of these pigmentary disorders.[14] Tinted sunscreens that provide photoprotection against visible light could be beneficial for patients with melasma or visible light-induced photodermatoses.[35]

## APPLICATION OF SUNSCREEN FOR DIFFERENT SKIN TYPES

A sunscreen combined with a moisturizer is an important recommendation for patients with acne.[36] It is advisable for such patients to avoid inorganic filters, on account of their dense and oily consistency.[22] Physical sunscreen formulations are usually less oily and might be suitable in patients with oily and acne-prone skin.[26] They are also useful in cases of sensitive skin and intolerance to chemical sunscreens.[26] Moreover, gel-based formulations or matte-finish sunscreens could be preferred for sensitive skin.[37] An Indian study by Sarkar et al established that regular usage of sunscreens with moderate SPF and high PA+++ values may offer efficient protection against pigmentation irregularities, and enhance the overall skin radiance in Indians with Fitzpatrick phototypes IV and V.

## COMBINATION OF SUNSCREENS WITH DEPIGMENTING AGENTS

The cornerstone of hyperpigmentation therapy is use of broad-spectrum sunscreens. Avobenzone absorbs light in the UVA range, but is unstable.[39] Its stability is increased by combining it with oxybenzone.[39] Many cosmeceuticals have physical sunscreens in the same formulation for additional benefits.[39] PABA or PABA-free UVB sunscreens with a waterproof claim and SPF of at least 15 are protective against UVB-induced hyperpigmentation.[40]

Conventional treatment of melasma includes elimination of any possible causal factors coupled with use of a sunscreen and depigmenting agents like hydroquinone, kojic acid, and azelaic acid.[41]

## POST-PROCEDURAL USE OF SUNSCREENS

After application of chemical peels, patients must use a broad-spectrum sunscreen on a daily basis to limit PIH development.[42] Sun protection creams with a minimum SPF of 50 are beneficial in such cases.43 Patients undergoing procedures like laser-based therapies that can induce PIH, are often advised to apply sunscreen regularly for several weeks before the procedure and to avoid sun exposure.[14] It has also been observed that broad-spectrum sunscreens with anti-inflammatory agents starting on the first day after ablative fractional skin resurfacing can reduce PIH after laser treatment at 1-week postoperatively.[44]

## USE OF SUNSCREEN WHILE WORKING INDOORS

People who work indoors can still be exposed to UV radiation from light bulbs or from working next to windows.[21] Such people could apply adequate sunscreen once in the morning.[21] Reapplication of sunscreen may not be required.[21] Constant exposure to heat and light while cooking can also aggravate chances of sensitive skin and pigmentation.[37] Hence, a sunscreen is recommended indoors in such cases.[37]

## VITAMIN D AND SUNSCREEN

Broad-spectrum sunscreens are unlikely to compromise vitamin D status in healthy people.[45] Vitamin D screening must be carried out for those at risk of hypovitaminosis, like patients with photosensitivity disorders, who need rigorous photoprotection.[45] Screening and supplementation is advised for such individuals.[45]

## NEED FOR SUNSCREEN EDUCATION IN INDIA

A study by Agarwal SB et al showed that consciousness about sunscreen was low among Indians.[46] Awareness about protective spectrum of sunscreens, correct method of application, and clearing misconceptions need to be the primary focus.[46] A comprehensive effort for improving patient education with respect to various aspects like primary prevention of skin cancer and photodamage must be implemented.[47]

## CONCLUSION

Photoprotection with the use of sunscreens essentially protects the skin from various deleterious effects of UV rays and prevents further grave consequences like sunburns and cancer. Application and reapplication of the adequate amount of sunscreen are essential for achieving maximum benefits of photoprotection. In spite of various

developments in photoprotection, further studies on the use of sunscreens specifically in the Indian population are required.

## ACKNOWLEDGEMENTS

The authors thank Scientimed Solutions Pvt. Ltd. for assisting in manuscript development.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: Not required*

## REFERENCES

1. Geoffrey K, Mwangi AN, Maru SM. Sunscreen products: Rationale for use, formulation development and regulatory considerations. Saudi Pharm J. 2019;27:1009-18.
2. Latha MS, Martis J, Shobha V, Sham Shinde R, Bangera S, Krishnankutty B, et al. Sunscreening agents: a review. J Clin Aesthet Dermatol. 2013;6:16-26.
3. Mancuso JB, Maruthi R, Wang SQ, Lim HW. Sunscreens: An update. Am J Clin Dermatol. 2017;18:643-50.
4. Ngoc LT, Tran VV, Moon JY, Chae M, Park D, Lee YC. Recent trends of sunscreen cosmetic: An update review. Cosmetics. 2019;6:64.
5. Sunscreens and photoprotection. Available at https://www.ncbi.nlm.nih.gov/books/NBK537164/ Accessed on 10 February 2021.
6. Ebrahimzadeh MA, Enayatifard R, Khalili M, Ghaffarloo M, Saeedi M, Yazdani Charati J. Correlation between sun protection factor and antioxidant activity, phenol and flavonoid contents of some medicinal plants. Iran J Pharm Res. 2014;13:1041-7.
7. Bens G. Sunscreens. Adv Exp Med Biol. 2014;810:429-63.
8. Pelizzo M, Zattra E, Nicolosi P, Peserico A, Garoli D, Alaibac M. In vitro evaluation of sunscreens: an update for the clinicians. ISRN Dermatol. 2012;2012:352135.
9. Kaimal S, Abraham A. Sunscreens. Indian J Dermatol Venereol Leprol. 2011;77:238-43.
10. Ou-Yang H, Stanfield J, Cole C, Appa Y, Rigel D. High-SPF sunscreens (SPF ≥ 70) may provide ultraviolet protection above minimal recommended levels by adequately compensating for lower sunscreen user application amounts. J Am Acad Dermatol. 2012;67:1220-7.
11. Snyder A, Valdebran M, Terrero D, Amber KT, Kelly KM. Solar ultraviolet exposure in individuals who perform outdoor sport activities. Sports Med Open. 2020;6:42.
12. Harrison SC, Bergfeld WF. Ultraviolet light and skin cancer in athletes. Sports Health. 2009;1:335-40.
13. Okon LG, Werth VP. Cutaneous lupus erythematosus: diagnosis and treatment. Best Pract Res Clin Rheumatol. 2013;27:391-404.
14. Fatima S, Braunberger T, Mohammad TF, Kohli I, Hamzavi IH. The role of sunscreen in melasma and postinflammatory hyperpigmentation. Indian J Dermatol. 2020;65:5-10.
15. Keyes E, Werth VP, Brod B. Potential allergenicity of commonly sold high SPF broad spectrum sunscreens in the United States; from the perspective of patients with autoimmune skin disease. Int J Womens Dermatol. 2019;5:227-32.
16. Kumari P, Suvirya S, Verma P, Pathania S, Shukla P. Sunscreens: The current scenario. JDA Indian J Clin Dermatol. 2019;2:01-6.
17. Singh LC. High altitude dermatology. Indian J Dermatol. 2017;62:59-65.
18. Isedeh P, Osterwalder U, Lim HW. Teaspoon rule revisited: proper amount of sunscreen application. Photodermatol Photoimmunol Photomed. 2013;29:55-6.
19. Taylor S, Diffey B. Simple dosage guide for suncreans will help users. BMJ. 2002;324:1526.
20. Diffey BL. When should sunscreen be reapplied? J Am Acad Dermatol. 2001;45:882-5.
21. Rungananchai C, Silpa-Archa N, Wongpraparut C, Suiwongsa B, Sangveraphunsiri V, Manuskiatti W. Sunscreen application to the face persists beyond 2 hours in indoor workers: an open-label trial. J Dermatolog Treat. 2019;30:483-6.
22. Schalka S, Steiner D, Ravelli FN, Steiner T, Terena AC, Marçon CR, et al. Brazilian consensus on photoprotection. An Bras Dermatol. 2014;89(6 Suppl 1):1-74.
23. Dale Wilson B, Moon S, Armstrong F. Comprehensive review of ultraviolet radiation and the current status on sunscreens. J Clin Aesthet Dermatol. 2012;5:18-23.
24. López-Jornet P, Camacho-Alonso F, Rodríguez-Espin A. Study of lip hydration with application of photoprotective lipstick: influence of skin phototype, size of lips, age, sex and smoking habits. Med Oral Patol Oral Cir Bucal. 2010;15:e445-50.
25. Sethi A, Kaur T, Malhotra SK, Gambhir ML. Moisturizers: The slippery road. Indian J Dermatol. 2016;61:279-87.
26. More BD. Physical sunscreens: on the comeback trail. Indian J Dermatol Venereol Leprol. 2007;73:80-5.
27. Li H, Colantonio S, Dawson A, Lin X, Beecker J. Sunscreen application, safety, and sun protection: The evidence. J Cutan Med Surg. 2019;23:357-69.
28. Nash JF, Tanner PR. Relevance of UV filter/sunscreen product photostability to human safety. Photodermatol Photoimmunol Photomed. 2014;30:88-95.
29. Gilaberte Y, Carrascosa JM. Sun protection in children: realities and challenges. Actas Dermosifiliogr. 2014;105:253-62.

30. Quatrano NA, Dinulos JG. Current principles of sunscreen use in children. Curr Opin Pediatr. 2013;25:122-9.
31. Shanbhag S, Nayak A, Narayan R, Nayak UY. Anti-aging and sunscreens: Paradigm shift in cosmetics. Adv Pharm Bull. 2019;9:348-59.
32. Lehmann P, Schwarz T. Photodermatoses: diagnosis and treatment. Dtsch Arztebl Int. 2011;108:135-41.
33. Medeiros VL, Lim HW. Sunscreens in the management of photodermatoses. Skin Therapy Lett. 2010;15:1-3.
34. Driscoll MS, Wagner RF Jr. Clinical management of the acute sunburn reaction. Cutis. 2000;66:53-8.
35. Lyons AB, Trullas C, Kohli I, Hamzavi IH, Lim HW. Photoprotection beyond ultraviolet radiation: A review of tinted sunscreens. J Am Acad Dermatol. 2020;20:S0190-9622.
36. Del Rosso JQ, Gold M, Rueda MJ, Brandt S, Winkelman WJ. Efficacy, safety, and subject satisfaction of a specified skin care regimen to cleanse, medicate, moisturize, and protect the skin of patients under treatment for acne vulgaris. J Clin Aesthet Dermatol. 2015;8:22-30.
37. Kohli M, Pant H, Dixit R, Parthasaradhi A. Expert consensus on defining sensitive skin and role of cosmeceuticals: an Indian perspective. Int J Res Dermatol. 2020;6:827-36.
38. Sarkar R, Garg VK, Jain A, Agarwal D, Wagle A, Flament F, et al. A randomized study to evaluate the efficacy and effectiveness of two sunscreen formulations on Indian skin types IV and V with pigmentation irregularities. Indian J Dermatol Venereol Leprol. 2019;85:160-8.
39. Sarkar R, Arora P, Garg KV. Cosmeceuticals for hyperpigmentation: What is available? J Cutan Aesthet Surg. 2013;6:4-11.
40. Verallo-Rowell V. The role of sunscreens in the therapy of melasma. Clin. Drug Invest. 1995;10:46-56.
41. Sardesai VR, Kolte JN, Srinivas BN. A clinical study of melasma and a comparison of the therapeutic effect of certain currently available topical modalities for its treatment. Indian J Dermatol. 2013;58:239.
42. Rendon MI, Berson DS, Cohen JL, Roberts WE, Starker I, Wang B. Evidence and considerations in the application of chemical peels in skin disorders and aesthetic resurfacing. J Clin Aesthet Dermatol. 2010;3:32-43.
43. Grajqevci-Kotori M, Kocinaj A. Exfoliative skin-peeling, benefits from this procedure and our experience. Med Arch. 2015;69:414-6.
44. Wanitphakdeedecha R, Phuardchantuk R, Manuskiatti W. The use of sunscreen starting on the first day after ablative fractional skin resurfacing. J Eur Acad Dermatol Venereol. 2014;28:1522-8.
45. Passeron T, Bouillon R, Callender V, Cestari T, Diepgen TL, Green AC, et al. Sunscreen photoprotection and vitamin D status. Br J Dermatol. 2019;181:916-31.
46. Agarwal SB, Godse K, Patil S, Nadkarni N. Knowledge and attitude of general population toward effects of sun exposure and use of sunscreens. Indian J Dermatol. 2018;63:285-91.
47. Vasicek BE, Szpunar SM, Manz-Dulac LA. Patient knowledge of sunscreen guidelines and frequency of physician counseling: A cross-sectional study. J Clin Aesthet Dermatol. 2018;11:35-40.

**Cite this article as:** Ghalla M, Dixit R, Murthy KS, Katta TP. Expert consensus on the use of sunscreen agents: Indian perspective. Int J Res Dermatol 2022;8:168-74.