Review Article

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Characteristics of Asian skin–revision

Abstract

Asians are a group with various skin phototypes, ranging from Fitzpatrick classification type III and IV in Chinese and Japanese populations and type IV and V in Indian and Pakistani populations. Asian skin tends to present post-inflammatory hyperpigmentation, melasma, lentigines and freckles, and nevi of Ota and Hori nevi. The main skin diseases reported include acne, atopic dermatitis and viral infections. Wrinkles and skin thickness are early signs of ageing in Caucasians but are less evident in Asian skin. Nevertheless, pigmentary changes occur earlier. The aim of this study is to show the importance of studying the characteristics of Asian skin in order to achieve better management of skin diseases in this population group that is increasingly common in the clinic. Based on a broad review of the literature, we report the characteristics of Asian skin, as well as some dyschromias and common skin disorders in this ethnic group.

Keywords: Asian skin, ethnic skin, melanin

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Introduction

The Asian population is becoming an important ethnic group due to their differential characteristics, way of life and peculiar habits. The term 'Asian' is used to describe people from Southeast Asia, the Far East or the Indian subcontinent. This designation embraces a group with several cutaneous phototypes varying from-according to the Fitzpatrick scale-type III (light brown) to IV (moderate brown) among Chinese and Japanese populations and types IV and V (dark brown) among Indian and Pakistani populations.[1] In the 21st century, there has been an important demographic change; half of the current world population is Asian. In the USA, the Asian population will double by 2050.[2,3] Based on this information, the importance of studying the characteristics of Asian skin is to improve the management of cutaneous diseases in this population group, which is increasingly present in dermatology outpatient clinics.[1,4,5]

The larger amount of melanin gives this ethnic group better natural photoprotection than that of other groups; however, as consequence, this population shows a greater tendency to have pigmentary disorders. Lentigines, ephelides and melasma are the most common epidermal abnormalities, and nevi of Ota and Hori are frequent dermal pigmentary disorders. Post-inflammatory hyperpigmentation is peculiar to this skin type, occurring after cutaneous damage, including the use of lasers and other light sources. Therefore, there is a need to study the characteristics of Asian skin and the differences from other skin types, for better selection of therapeutic strategies and better clinical and cosmiatric management of dyschromias and other skin conditions.[1]

Discussion

The tones of the various skin types vary in terms of quantity and cutaneous distribution of melanin. The number of melanocytes is basically the same in all skin types; however, skin with higher phototypes shows larger melanocytes that produce more melanin, and melanosomes are dispersed in all keratinocyte layers.[1,6] These structures contain more melanin than small and joined melanosomes with less melanin among people of lower phototypes. In skin with higher phototypes, melanosomes are damaged more slowly, after being relocated to keratinocytes.[7–10] These characteristics promote more efficient absorption and reflection of ultraviolet light (UV), allowing more substantial photoprotection, because there is less damage to cellular DNA.[1,11] Nevertheless, authors report atrophy and epidermal atypia, damage to dermal collagen and to elastin, and pigmentary disorders in this ethnic group, in cases of no photoprotection.[1,12]

The term 'race' refers to people with the same appearance, with or without genetic similarity, but with similar physical characteristics.[2,13,14] Ethnicity is a subjective term.[2,15] Ethnicity means an identification of a social group of races with similarities in terms of culture, language, religion, shared past and other particulars.[16] Ethnicity is self-assigned: each person determines the group that they most readily identify with and essentially feel most connected to. Unique qualities of each ethnicity tend to originate from the group, and they are transmitted to future generations.[2,15] 'Culture' refers to a set of values, conventions, creeds and social practices of a group; the concepts of race and ethnicity can be included or not.[2,13]

The term 'Asian' refers to people from Southeast Asia, the Far East or the Indian subcontinent. This designation embraces a group with several cutaneous phototypes varying from—according to the Fitzpatrick scale—type III (light brown) and IV (moderate brown) among Chinese and Japanese populations and types IV and V (dark brown) among Indian and Pakistani populations.[1] In the 21st century, there has been an important demographic change; half of the current world population is Asian. In the USA, the size of the Asian group will double by 2050.[2,3] More conservative projections suggest that the current minority population of Hispanics, Asians and Africans in the USA will outnumber the white population by 2050.[2,17] There are reports comparing various skin properties among ethnicities, for example, the transepidermal water loss, and water content, variability of corneocytes, pH, vascular reactivity, elastic extensibility, lipid content, superficial microflora and microscopic evaluation of mast cell granules. Nonetheless, the results are conflicting, and further studies are needed for more conclusive results.[18]

There are some hypotheses regarding the development of epidermal pigmentation during human evolution. Skin with higher phototypes, including Asian skin, shows more cohesive and intact stratum corneum (due to lower pH, there is a reduction in the activity of a serum protease-kallikrein-in darker skin), improved permeability of barrier function, and lower susceptibility to infections, because the more acidic pH favors increased normal cutaneous microflora.

This functional improvement depends on various factors, including the lower pH in the most superficial epidermis, probably due to the persistence of the most acidic melanosomes in this area as well as to the conservation of genes related to the acidification of melanosomes and the synthesis of eumelanin in these populations. With a lower pH in the stratum corneum, the activation of two enzymes that more efficiently hydrolyse important fat precursors in ceramides occurs. The development of interfollicular cutaneous pigmentation, due to stress caused by chronic cutaneous dryness and by UV radiation, shows faster recuperation after external acute injuries than that observed in higher phototypes (Fitzpatrick scale types I and II). This difference is independent of race or ethnicity. Finally, there is evidence that darker-toned skins have better innate immunity, an adaptive advantage.[19–27]

Other authors observe a lack of correlation between the amount of keratin or the racial origin and the efficiency of repairing DNA damage from UV radiation, showing that this efficiency is independent of skin colour: there are people with lower phototypes who have effective DNA damage repair and people with higher phototypes who do not have effective DNA damage repair. According to these authors, the variability in this efficiency among persons in the same ethnic group is large. This process is important to avoid the transmission of mutations that can generate carcinogenesis in daughter cells.[11]

Nevus of ota

Nevus of Ota affects approximately 0.6% of the Asian population. It includes dermal melanocyte hamartoma. Clinically, nevi of Ota present as a bluish hyperpigmentation affecting the distribution region of the trigeminal nerve. There are reports of good therapeutic response to QS Nd YAG 1064nm, QS Ruby and QS Alexandrite lasers.[1,28,29] The risk of recurrence is from 0.6 to 1.2%; this information must be considered when treating children with nevi of Ota.[1,30]

Hori nevus

Hori nevi (macules similar to acquired nevi of Ota) affect approximately 0.8% of the Asian population. They are described as brownish-blue hyper pigmentations in the frontal region, bilateral malar region and temple of middle-aged women. They do not affect the mucosa. Histopathologically, there is melanocytosis in the surface and middle layers of the dermis. Lentigines and melasma can be seen with this disorder. There are reports of use of QS Alexandrite, QS Ruby and QS Nd YAG 1064nm lasers for treatment, with good responses. Nevertheless, there is a need for small intervals between treatments and a higher number of sessions. Temporary post-operative hyperpigmentation occurs in most patients, constituting a common adverse reaction. Furthermore, permanent hypo pigmentation was reported as a consequence of the use of QS Ruby lasers.[1,31–35]

Dyschromias

There is a report of a recently recognized dermal melanocytic disorder, acquired bilateral melanosis of the neck, among perimenopausal Korean women. This disorder presents as a hyperpigmentation that affects the lateral cervical region exclusively, with sparse or mottled, bilateral and symmetric, brownish/bluish pigmentation. On histopathology, there is accumulation of dermal pigment and lymphocytic perivascular infiltration compatible with post-inflammatory hyperpigmentation (PIH). However, the pathogenesis is unknown, and predisposing factors have not been identified. There is no consensus regarding treatment; treatment remains a challenge, because it can worsen the hyperpigmentation.

This disorder could be a continuation of Riehl melanosis, a pigmented contact dermatitis.[36,37]

Melanoma

Skin with higher phototypes has more melanin, in other words, there is more effective natural protection against damage to DNA by UV radiation. Moreover, such skin seems to have more efficient mechanisms of repairing DNA, diminishing the probability of carcinogenesis.[1,11] In relation to melanoma, Japanese people have twice the incidence (2.2 in 100,000) of other Asian ethnicities. The most common locations of melanoma in dark skin are photo protected areas, including mucosal, subungual, palmar and plantar surfaces. According to a Japanese work, the foot was the most common affected site, where acral lentiginous melanoma accounts for 50% of the cases.[1,38]

Other neoplasias

Basal cell carcinoma (BCC) is the most common nonmelanoma cutaneous malignancy in Chinese and Japanese people, followed by squamous cell carcinoma (SCC).[1,38–40] Chinese individuals, who have generally lighter skin than other Asian individuals, have a probability of BCC and SCC two-fold higher than that of Indian and Malaysian individuals, who have generally higher phototypes.[1] Among Japanese populations, mycosis fungoides and cutaneous T-cell lymphoma are fourth among the most common skin cancers. Hypopigmented mycosis fungoides tends to affect young melanodermic subjects. Clinically circumscribed and itchy macules and hypopigmented plaques are observed.[1,41–43]

Keloid scars

According to Ud-Din S and Murray JC, keloid scars are raised reticular dermal lesions that spread beyond the margins of the original wound site and do not revert spontaneously.[44,45] The influence of ethnicity on keloid scarring is significant. Keloid scarring is considered an important clinical problem in some ethnicities, and there is a higher prevalence among individuals with higher phototypes;[44,46–48] especially in those of Hispanic, Asian and African ancestry.[44,49] The familial predominance and presence in twins suggest a strong genetic predisposition to the formation of keloid scars.[44,49] Keloid scarring affects only humans, and there is no animal model.[44]

In addition to genetic susceptibility, other factors have been suggested to influence keloid scar formation, such as aberrant collagen production, the abnormal regulation of growth factors (TGF-β, insulin-like growth factor, IL-13, connective tissue growth factor,[50–56] and vascular endothelial growth factor (VEGF)),[44] excessive tension on injuries, infections, foreign bodies[44,57,58] and burns.[50] Keloid scars can present with pain, itching and disfigurations, and they are difficult to treat.[50] They can appear months after injury (in general, less than one year, growing over time),[44,57,59] while hypertrophic scars develop in weeks.[44,60,61] Intralesional steroid injection reduces collagen synthesis,[44,62] can inhibit the proliferation of fibroblasts, and stimulates the regression of keloids.[44,63] Nevertheless, the efficacy of sessions (one or multiple) is variable, with recurrence rates from 9 to 50%.[44,48,64] Side effects include telangiectasia, atrophies and dyschromias.[44,65] The application of silicone gel sheeting is thought to minimize mobility and reduce tension in the scar.[44,58,66] This material acts as an impermeable membrane for maintaining skin hydration[44,67,68] and normalizing barrier function.[50,69] Fluorouracil (5-FU), a pyrimidine analogue, is converted to a substrate that leads to

the inhibition of DNA synthesis.[44,70] 5-FU limits keloid growth both *in vivo* and *in vitro*.[44,71,72] Significant side effects are ulcerations and hyperchromias.[44,73–75]

In relation to radiotherapy, there is evidence that irradiation can restore a balance between the synthesis and degradation of collagen in keloid disease.[44,76] Bleomycin is more useful in the treatment of keloid scars, than is cryosurgery or intralesional steroid injections.[44,77,78] Imiquimod is an immune modulator that induces interferon-α at the site of application[44,79] and interacts with Toll-like receptors.[50,79,80–82] Imiquimod can be used in polytherapy to prevent the recurrence of keloid scars after surgical excision.[44,83]

Tacrolimus inhibits GLI-1 signaling[50,80] and the production of angiogenic factors.[50,84] Recently, a cytotoxic effect was observed in photodynamic therapy with methyl aminolaevulinate and 5-aminolaevulinic acid (5-ALA) in keloid fibroblasts from various lesion sites.[44,85,86] Electric stimulation can suppress the formation of type 1 collagen in keloid disease and has been used for relieving symptoms of pain, itching and inflammation. Electro stimulation was suggested as combined or adjuvant treatment.[44,87] Keloid surgical excision must be done carefully, because the risk of recurrence is great,[44,88] and excision can widen scars and lead to larger keloids in the case of recurrence.[44,89] Intralesional steroid injections after excision are recommended.[44,90] Cryosurgery has been used on smaller lesions, but its use has been limited by the considerable pain and prolonged healing time following treatment.[44,91] Pulsed dye lasers target small vessels.[50] Finally, it is important to invest in measures to prevent keloid scars, as there is currently no level-one evidence of an effective treatment modality.[44]

Post-inflammatory hyperpigmentation (PIH)

Asian skin tends to show post-inflammatory hyperpigmentation (PIH), which can be considered an error in the pathophysiological response to different skin injuries. Increased melanocytic activity, dermal melanophages and the deposition of haemosiderin after haemorrhages are some factors that contribute to the development of this disorder. Cutaneous endogenous inflammatory disorders and iatrogenic sources, including the inappropriate use of lasers, can cause the rupture of the dermoepidermal junction; the extension of this rupture, together with the degree of inflammation, is related to the severity of PIH.[1,92] In the medical literature there is a hypothesis that PIH occurs because of the release of inflammatory mediators and cytokines, for instance, prostaglandins, leukotrienes, and thromboxanes, during the inflammatory process.[7,93] With the increased use of lasers and other light sources in Asian patients, the prevention and correct treatment of PIH become very important. Melanin at high levels in Asian skin can act as a competitive chromophores for lasers and other light sources that target blood vessels and pigments.[1,92] Lee et al. suggested evaluating the probability of Asian patients showing PIH after procedures including lasers and other light sources through the observation of the difference in tone between the interphalangeal (IP) joints and the surrounding areas: the greater is the tone difference, the higher the possibility of PIH. People who tend to have PIH develop more pigmentation at the joints, especially the IP joints, because the hands are the most exposed and moved areas of the skin.[94]

Cutaneous ageing

Ageing Asian skin presents pigmentary changes and the emergence of wrinkles. Moderate-to-severe wrinkling in Asians becomes apparent at approximately 50 years of age, one or two decades later than in Caucasians; there is a tendency to involve deep muscle layers beyond the skin.[1,7,95–99] Moreover, Asian individuals do not have wrinkles as marked and as deep as those in Caucasians of the same age. This difference may be because of differences in sun exposure and defence mechanisms against chronic sun exposure. These mechanisms include horny layer thickening, the ability to produce melanin and the presence of epidermal proteins such as urocanic acid. Melanin reduces the penetration of UV radiation in the dermis and in connective tissues, because melanin absorbs and dissipates UV radiation. Furthermore, melanin captures free radicals to build a stable melanin polymer, minimizing the photo degradation of collagen and other viable tissues. This process occurs more intensively among phototypes III and IV; therefore, the wrinkles, skin thickness and other signs of early ageing in Caucasians are less apparent in Asians. However, pigmentation changes, which are defence mechanisms occur earlier in Asian individuals and occur with a higher incidence than skin wrinkling.[1,100–105] The development of benign skin lesions, such as solar lentigines, seborrheic keratosis, and dermatosis papulosa nigra (DPN), correspond to other manifestations of ethnic skin photoageing.[1,95,103]

Darker-skinned patients present greater volume loss at the inferior portion of the face during ageing than that observed in the wrinkles and rhytides that appear in light-skinned Caucasians.[7,106] Darker-skinned patients also tend to show prominent mid-face ageing, with upper eyelid laxity, sagging of the malar fat pads towards the nasolabial folds, and jowl formation.[96,97] A study evaluated ethnic differences in the structural properties of facial skin; in Asians, authors observed a somewhat smaller total area of pores than in Caucasians and Hispanics. There were no differences in the average pore size between Asians and Caucasians. It was also observed that the epidermal architecture around pores contributed to their superficial appearance in Hispanics, African-Americans and Asians.[107]

Ephelides and lentigines

Other pigmented benign lesions common in Asians are lentigines and ephelides. Ephelides are lesions relatively uniform in size, colour and distribution. Histopathologically, they consist of lesions with epidermal hyperpigmentation and no increase in the number of melanocytes. Lentigines vary in size and colour, and they are not evenly distributed. Lentigines increase in number and prevalence with age. Histopathologically, it is observed that there is an increase in the number of melanocytes, epidermal hypermelanosis and extended epidermal ridges.[1,108]

Melasma

Melasma is an acquired symmetrical hypermelanosis occurring mainly in photo exposed areas of the skin in Asian middle-aged women. Its aetiologies include genetic factors, UV radiation exposure, hormonal therapies, pregnancy and phototoxic drugs. Melasma is still one of the most difficult dermatoses to treat.[1] Kang et al. reported that the skin of a patient with melasma shows more melanin throughout the thickness of the epidermis, including the stratum corneum, while the same skin without melasma has melanin confined mainly to the basal layer. In lesions of melasma, there is a greater number of melanocytes and melanosomes, widely spread on the layers of keratinocytes.[109] Other authors report that skin with melasma shows changes in dermal structures, affecting the basal membrane and increasing vessels in the superficial dermis. These alterations influence the development

of epidermal hyperpigmentation in melasma.[36] The increased activity of enzymes involved in melanogenesis results in hyperactive melanocytes, with an increase in melanin synthesis, the transfer of melanosomes and a decrease in the degradation of keratinocytes. Sublethal damage by laser in these unstable keratinocytes can promote increases in melanin and leads to PIH.[1,110,111] Wood's lamp examination or photography via UV radiation before treatment with intense pulsed light (IPL) is suitable in Asian skin, because there are studies referring to manifestations of previously subclinical melasma after IPL treatment.[1,110,111] The use of clarifiers and photo protectors for at least 6weeks and preferably for 3months before any treatment with laser or other light sources can help suppress the activity of these hyperactive melanocytes, consequently reducing the risk of PIH development.[1,92] There are reports of the combination of hydroquinone with topical corticosteroids and tretinoin as a primary treatment for melasma.[1,112,113] Drawbacks of topical treatment include the long required periods of treatment to achieve an apparent result and the need for patient adherence to treatment.[1] Other adjuvant topic treatments for melasma in Asians include peelings with salicylic acid, glycolic acid and trichloroacetic acid.[1,114–116]

Miscellaneous

The primary skin diseases reported in Asians are acne, atopic dermatitis and viral infections. Urticaria is more common in Chinese individuals, while alopecia and psoriasis are more common in Indian individuals, and PIH is more common in Malaysian and Indian individuals, who have higher phototypes than do Chinese individuals.[1,117] Moreover, Asians have a higher predisposition to hypertrophic scars and keloid scars than do Caucasians.[1,118] Another common disease in Asians is primary cutaneous amyloidosis, presenting most commonly as either lichen or macular amyloidosis, the most commonly seen skin disease amongst Chinese individuals.[1,119] A rare form of cutaneous amyloidosis is anosacral amyloidosis, reported previously in Chinese and Japanese patients. Clinically, this disorder presents as well demarcated, pruritic, brownish patches or plaques fanning out in lines from the anus to the sacral region. It is more common in men than in women.[1,120]

Conclusion

Considering demographic changes, there will be an increasing number of Asian and other ethnic groups presenting in our dermatology outpatient clinics. The necessity and importance of knowledge about differences between skin tones, physiologies and particularities of skin in different racial populations guide us more safely to choose the right therapeutic strategies. The Asian population has been progressively increasing. Greater amounts of epidermal melanin confer more efficient protection against UV radiation but can generate several pigmentation disorders. Asian skin shows different characteristics than skin of other ethnicities and these differences must be taken into account during clinical and cosmiatric management of pathologies and skin disorders in this population group.

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Conflicts of interest

Authors declare that there is no conflict on interest.

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