Chapter 2
Cosmetic Practices

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With greater globalization and immigration, cultural competency and cultural humility is becoming increasingly important in clinical settings. Cosmetic practices are extremely diverse and are often influenced by cultural perceptions of beauty. Recognizing the various cosmetic practices and their associated dermatoses that exist among cultures is imperative to ensure proper quality of care. Understanding the cultural implications behind practice will allow for better treatment options and a stronger relationship between the physician and patient. This chapter will cover the cultural practices of henna, threading, bindi and kumkum, sari drawstrings, decorative nose piercings, scarification, skin lightening, and cultural tattooing and their associated dermatoses.

Henna

Henna is a dye from the plant *Lawsonia Inermis* traditionally used in South Asian, Middle Eastern and African populations for cultural and cosmetic practices including temporary tat-

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tooing or hair dye for weddings, holidays, ceremonies, and rituals [1]. Henna use has recently become popular in Western countries as a temporary tattoo, especially in tourist areas [2]. Lawsone is a compound found in natural henna that produces a temporary red pigment; thus natural henna is also referred to as "red henna". Most modern hennas, or "black henna", use p-phenylenediamine (PPD) as an additive to shorten the drying time and produce a black pigment [2]. PPD is a common ingredient in hair dyes and is a known sensitizer [3]. Other commonly found ingredients include heavy metals such as nickel (<2.5–3.96 ppm), cobalt (2.96–3.54 ppm), and lead (2.29–65.98 ppm) [4, 5]. Ingredients added to improve color or texture include coffee, black tea, lemon juice, eucalyptus, clove, mustard oil, vinegar, indigo powder, fenugreek seeds, okra, and tamarind paste [3, 6, 7]. A rarer form of henna known as henna stone is commercially sold as a solid material that is crushed into powder to make a black henna paste for temporary tattooing or hair dyeing [8]. PPD concentrations in henna stone (84.89–90.90%) [9] have been found to be significantly higher than those in black henna (2.35–29.5%) [4, 10, 11].

The most frequent complication from henna application is allergic contact dermatitis (ACD). ACD incidence at the site of henna application is thought to be as high as 2.35% [12]. However, few allergic cases have been reported due to natural red henna [6, 13]. Most complications of henna use arise from PPD exposure in black henna [1]; positive PPD patch tests have been reported in many cases of henna-induced ACD. PPD has also been found to cause airborne contact dermatitis from henna stone [14]. Sequelae of these reactions include hyperpigmentation, keloids, leukoderma, and permanent post-inflammatory hypopigmentation [15–18]. It is important to note that PPD is not the only compound associated with henna-

induced ACD. One case reported a patch test positive for resorcinol as a rare allergen of black henna-induced ACD [19]. In addition, reported instances of ACD had patch tests negative for PPD [20].

Other complications of henna use include contact urticaria, irritant contact dermatitis, erythema multiform-like reaction, temporary hypertrichosis, superficial epidermal necrosis, lichenoid reactions, pigmented contact dermatitis, and angioedema [3, 12, 15, 16, 21–24]. Henna use has also been associated with many systemic and life-threatening complications. Multiple cases of life-threatening hemolysis in children with glucose-6-phosphate dehydrogenase deficiency secondary to henna usage have been reported [25, 26]. It is believed the structural similarity of lawsone to the oxidant 1,4-naphthoquinone accounts for hemolysis in G6PD deficient patients [26]. Rare instances of acute kidney injury, angioedema, and acute compartment system have been associated with henna use [21, 27, 28]. One case reported severe upper airway obstruction following ingestion of PPD in henna stone solution, eventually requiring emergency tracheotomy [29]. Hairdressers and artists are at higher risk to henna complications due to occupational exposure. One study found that 3.2% of Indian beauticians had positive patch tests to henna mixture [30].

Patients experiencing complications from henna are advised to avoid henna products containing PPD [1]. Pure henna is a safer alternative and should be used instead of black henna.

Threading

Threading (*bande abru* in South Asia, *khite* in Arabic, *fatlah* in Egypt) is a form of temporary hair removal common in South Asian and Middle Eastern countries but is gaining popularity globally for its affordability, precision, tolerability,

and efficiency [1, 31]. Hair removal utilizing threading is most common on the cheeks, forehead, or ears for men and on the eyebrows, cheeks, chin, and upper lip for women [32]. Hairs are enclosed in an open loop of thread that is secured by the operator. The operator closes the loop of thread with their hands in a rapid, tight motion to trap the hair in the loop of thread and pull the entire hair shaft out. Tension is maintained on the thread by having the operator tie the thread around their neck or holding it in one's mouth. High cotton thread tends to grip hair better and are preferred to synthetic thread. Mild pain is often reported with threading [33]. Facial threading has been found to reduce skin roughness, producing an effect similar to exfoliation [31].

Although threading is considered relatively safe, there are complications associated with this epilation technique. Common complaints include pruritus, erythema, edema, irritant dermatitis, and dyspigmentation at the site of hair removal [13, 32, 33]. Dermatoses associated with threading include bullous impetigo, folliculitis, pseudofolliculitis, verrucae, koebnerized vitiligo, and molluscum contagiosum [32, 34–39]. Sequelae of bullous impetigo include post-inflammatory hyperpigmentation [32]. Reported cases of verrucae have resulted from both direct infection after threading and koebnerization of human papillomavirus from an initial lesion elsewhere on the body [34, 35, 38]. Although rare, damage to the skin barrier during threading increases the risk of infection [38, 40]. Potential sources of contamination include the thread, the operator's hands or mouth, cotton balls, and powder applied during threading [38, 40]. Undesirable effects of threading are highly dependent on the skill of the operator and the extent of skin abrasion from the thread movement [35]. Aseptic technique should be practiced by the operator to decrease infectious sequelae; this includes cleaning the area to be treated, avoiding placing the thread in the operator's mouth, and using sterilized single-use thread [40, 41].

Bindi and Kumkum

Bindi and Kumkum are commonly worn by Hindu women as a decorative adornment to the forehead (Fig. 2.1). Traditionally, they were used as a symbol of marital status but have since been popularized as a decorative cosmetic. The terms Kumkum and bindi are often used interchangeably but are not synonymous. Kumkum is applied as a paste or powder in a reddish color, and traditionally prepared at home with turmeric powder [42]. Current preparations have been found to include coal tar dyes, toluidine red, erythrosine, lithol red calcium salt, lead oxide, fragrances, groundnut oil, tragacanth gum, parabens, canaga oil, sandalwood, thimerosal, propyl gallate, PPD, Sudan-1, Brilliant Lake Red R, and aminoazobenzene [42–49]. Bindi is usually applied as a self-stick adhesive (Fig. 2.2), though a paste form is also available [42]. Compounds found in bindi include gallate mix, thimerosal, nickel, polyvinylchloride, PPD, tert-butyl hydroquinone, aminoazobenzene, Disperse Blue 124, Disperse Blue 106 [44, 45, 50, 51].

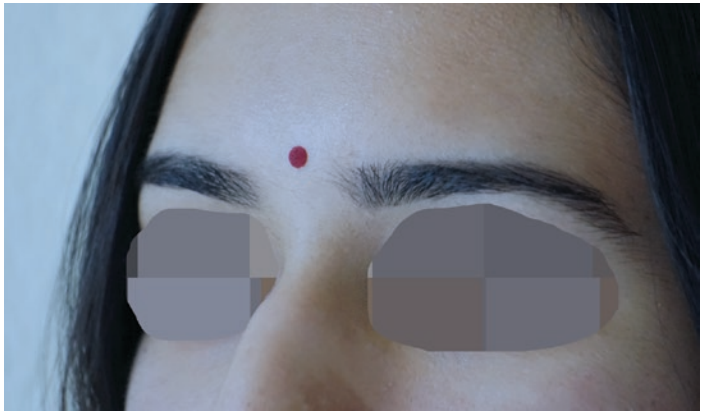

Figure 2.1 Adhesive Bindi worn on the forehead

FIGURE 2.2 Packets of self-stick adhesive Bindi

Contact leukoderma is a common complication reported from adhesive bindi use [52–55]. Para-tertiary-butylphenol (PTBP) has been found in bindi adhesive material but patch tests reveal PTBP is not the source of hypersensitivity [52, 53]. Bajaj reports all subjects in a study showed positive patch tests to the adhesive side of the bindi [56]. Depigmentation is likely attributed to individual susceptibility or prolonged bindi use [52, 53]. Other dermatoses reported include allergic contact dermatitis, pigmented contact dermatitis, contact vitiligo, lupus vulgaris, hyperpigmentation, and foreign body granuloma formation [51, 57–62]. Contact dermatitis often presents as erythema with papules and vesicles at the site of bindi application [61]. Individuals with adverse reactions are advised to discontinue use of bindi and Kumkum.

Sari Drawstrings

South Asian traditional clothing such as saris and salwaars contain drawstrings to secure the clothing around the waist. Saris are a single piece of fabric, typically 6 yards long,

FIGURE 2.3 Traditional salwar with drawstring

draped around the body with an underlying petticoat containing the drawstring [1]. Salwaar is the lower trouser portion of the "salwar kameez" trouser and tunic combination [63]; salwaars are secured to the abdomen with a drawstring (Fig. 2.3).

Drawstring complications result from a combination of chronic friction, humidity, sweat, and abdominal folds [63]. Chronic frictional pressure from the drawstring can create a lichenified and hyperkeratotic band of hyperpigmentation [1, 63]. The skin where the drawstring is tied is prone to koebnerization of pre-existing vitiligo and lichen planus (LP) [63]. Koebnerization of vitiligo and LP has been reported from friction of sari drawstring use [64, 65]. Given the relative humidity at the abdominal location, sweating and obesity at the drawstring line lead to an opportunity for secondary cutaneous infection by bacteria and fungi. Locally induced inflammation may also contribute to pruritus, irritant dermatitis, or allergic contact dermatitis [63]. In rare cases, similar to Marjolin's ulcer seen in chronic wounds or scars, a form of squamous cell carcinoma called "sari cancer" can occur from the chronic friction [63]. Patients are advised to tie the draw-

string less tightly to reduce the amount of friction, especially those predisposed to vitiligo, LP, or other dermatological conditions [41].

Decorative Nose Piercings

Cosmetic nose piercing originated in the Middle East over 4000 years ago and has since gained worldwide prevalence [66]. Decorative nose piercings carry a cultural significance in many South Asian countries because they are often worn by the bride at marriage ceremonies [1]. The piercings generally consist of non-allergenic metals such as stainless steel, gold, niobium, and titanium but can contain allergens such as nickel [67].

Complications from nose piercings include allergic contact dermatitis, infection, keloid formation, scarring, bleeding, and collapse of the nasal wall [67, 68]. Post-piercing complications include infections most commonly due to *Staphylococcus aureus, Pseudomonas aeruginosa, Mycobacterium tuberculosis, Streptococcal pyogenes,* atypical mycobacteria, along with viral hepatitis [67–69]. Systemic infective endocarditis is a rare but reported sequela [68, 69]. Rare cases of pyogenic granuloma persistent telangiectatic erythema, and basal cell carcinoma as complications of nose piercing have been reported [69–71]. Nonsterile instruments, improper technique, non-hygienic standards, and inadequate post-piercing care pose a higher risk of developing complications [68].

Scarification

Scarification is the process of intentionally creating superficial scars on the skin using a knife, razor blade, stone, or glass [72]. This practice is commonly seen in African societies for therapeutic purposes and cultural expression such as community status, passage into adulthood, or spiritual or tribal

identity [72, 73]. Therapeutic efficiency has not been proven with scarification [73]. Although prevalence of scarification is decreasing, it still remains popular in some traditional societies [74].

The most common complication associated with scarification is keloid formation, and often this is the desired effect [1]. Scarification has been associated with HIV, hepatitis B, hepatitis C, filarial elephantiasis, squamous cell carcinoma, and sarcoidosis [75–79]. Sterile technique should be practiced to decrease the risk of infectious sequelae [80].

Skin Lightening

Skin lightening practices are commonplace in Asia, Africa, the Caribbean, the Middle East, South America, Central America, Europe, and North America [81–86]. Prevalence of skin lightening is reported anywhere from 26% in Senegal to 75% in Nigeria [86]. Skin lightening practices are widely used by darker skinned patients for cosmetic enhancement often related to the cultural belief that a lighter skin tone is more attractive. There may also be cultural implications such as increasing prospects for marriage or representing a higher caste [86].

The composition of skin lightening creams is extremely variable within and between countries. Ingredients used in these creams are often prohibited or obtained illegally [81]. The standard skin lightening ingredient is hydroquinone however the compound is banned in many countries including the European Union and Japan [87]. Other compounds that have been found in topical skin lightening products include corticosteroids, glutathione, mequinol, retinoids, azelaic acid, arbutin, kojic acid, aleosin, licorice extract, ascorbic acid, N-acetyl glucosamine, sodium metabisulfite, kojic acid, 5,5′-dipropylbiphenyl-2,2′-diol, phenylethyl resorcinol, 3-o-ethyl ascorbic acid, lemon juice, potash, toothpaste, methyl gentisate, peroxides, and chlorates [1, 87–93]. Heavy metals are common additives in skin lighteners. Most concerning is the presence of mercury in these products [94]. One

study found the prevalence of mercury above 1000 ppm in skin lighteners to be 6.0%, with some estimates reported as high as 16% [94]. Other metals found in these products include nickel, lead, chromium, cobalt, manganese, copper, aluminum, iron and zinc [84, 95], often in excess of recommended safety limits.

Up to 75% of individuals using skin lighteners have reported associated complications, with the degree of side effects experienced often correlating with the duration of product usage [96]. Because of the variability in the composition of skin lighteners, it can be difficult to deduce the specific effects of each component. Contact dermatitis from skin lightener usage has been attributed to numerous ingredients including but not limited to hydroquinone, sodium metabisulfite, kojic acid, 5,5′-dipropylbiphenyl-2,2′-diol, phenylethyl resorcinol, licorice extracts, and arbutin [88–91, 97–99]. More serious or systemic complications include leukoderma, toxic epidermal necrolysis-like chemical burns, tinea infection, corneal or scleral pathology, and squamous cell carcinoma [85, 100–103].

Specific complications are associated with the three most common classes of skin lightening ingredients: hydroquinone, corticosteroids, and mercury derivatives. Exogenous ochronosis is the most permanent complication of hydroquinone use in skin lighteners [104] Given their secondary bleaching effect, topical corticosteroids may be incorporated into skin lighteners and used unknowningly for prolonged periods of time. Extended use of corticosteroids for skin lightening can lead to skin atrophy, dermatitis, folliculitis, and rosacea [104]. Mercury is known to cause numerous neurologic, neonatal, and renal toxicities including paresthesia, respiratory distress, numbness, ataxia, and seizures. Concentrations of mercury in skin lightening products are often above recommended limits, making mercury complications more likely [1]. 45% of a sample of mercury-containing skin lighteners were found to contain over 10,000 ppm of mercury, well in excess of the FDA's limit of 65 ppm [94].

Cultural Tattooing

Ritual tattooing is a permanent pigment implantation into the skin for cultural purposes [1]. Many religions, particularly Hinduism and Buddhism, use tattooing as a way to manifest devotion, represent protection against evil, or symbolize identification with a group [74, 105]. One example is the practice of gingival tattooing in Ethiopian culture where a blue pigment is introduced to the gingiva through a needle [106].

Up to 5% of tattoo recipients develop cutaneous infection complications from *Staphylococcus Aureus* or *Streptococcus Pyogenes* such as impetigo, cellulitis, erysipelas, or abscesses [107]. Other cutaneous complications include hyperpigmentation, allergic contact dermatitis to pigment, keloid formation, contact urticaria, and koebnerization [79, 108]. Systemic complications often arise from disseminated infection of hepatitis B, hepatitis C, and HIV due to non-sterile technique [107]. The risk of these infections remains higher in cultural and ritual tattooing where sterile technique is not regularly observed. Serious complications reported include spinal abscess, retinal vasculitis, endocarditis, uveitis, and systemic zygomycosis [79, 107, 108].

Conclusion

As cultural cosmetic practices such as threading and henna become more prevalent in Western countries, it is increasingly important that dermatologists are aware of the skin manifestations of these practices. Numerous pathologic consequences are associated with these techniques and require proper diagnosis and treatment. Furthermore, an understanding of cultural competency is essential for an effective physician-patient relationship. Identifying the diagnosis and treatment addresses the patient's physical problems but does not tackle the patient's health beliefs and practices. Cultural

competency is an important step towards comprehensive patient care that begins with understanding various cultural practices.

References

1. Vashi NA, Patzelt N, Wirya S, Maymone MBC, Kundu RV. Dermatoses caused by cultural practices: cosmetic cultural practices. J Am Acad Dermatol. 2018;79(1):19–30.
2. Le Coz CJ, Lefebvre C, Keller F, Grosshans E. Allergic contact dermatitis caused by skin painting (pseudotattooing) with black henna, a mixture of henna and p-phenylenediamine and its derivatives. Arch Dermatol. 2000;136(12):1515–7.
3. Kazandjieva J, Grozdev I, Tsankov N. Temporary henna tattoos. Clin Dermatol. 2007;25(4):383–7.
4. Kang IJ, Lee MH. Quantification of para-phenylenediamine and heavy metals in henna dye. Contact Dermatitis. 2006;55(1):26–9.
5. Jallad KN, Espada-Jallad C. Lead exposure from the use of Lawsonia inermis (henna) in temporary paint-on-tattooing and hair dying. Sci Total Environ. 2008;397(1–3):244–50.
6. Polat M, Dikilitas M, Oztas P, Alli N. Allergic contact dermatitis to pure henna. Dermatol Online J. 2009;15(1):15.
7. Swan BC, Tam MM, Higgins CL, Nixon RL. Allergic contact dermatitis to substitute hair dyes in a patient allergic to para-phenylenediamine: pure henna, black tea and indigo powder. Australas J Dermatol. 2016;57(3):219–21.
8. Ozkaya E, Yazganoglu KD. Henna stone: a lesser-known solid material from which to obtain black henna paste. Contact Dermatitis. 2013;69(6):386.
9. Ozkaya E, Yazganoglu KD, Arda A, Topkarci Z, Ercag E. The "henna stone" myth. Indian J Dermatol Venereol Leprol. 2013;79(2):254–6.
10. Almeida PJ, Borrego L, Pulido-Melian E, Gonzalez-Diaz O. Quantification of p-phenylenediamine and 2-hydroxy-1,4-naphthoquinone in henna tattoos. Contact Dermatitis. 2012;66(1):33–7.
11. Al-Suwaidi A, Ahmed H. Determination of para-phenylenediamine (PPD) in henna in the United Arab Emirates. Int J Environ Res Public Health. 2010;7(4):1681–93.

12. Berih A, Berhanu A. Allergic dermatitis – black henna (para-phenylenediamine) use among the East African patient population in a general practice setting. Aust Fam Physician. 2014;43(6):383–5.
13. Gupta D, Thappa DM. Dermatoses due to Indian cultural practices. Indian J Dermatol. 2015;60(1):3–12.
14. Ozkaya E, Topkarci Z. Airborne allergic contact dermatitis caused by a henna stone. Contact Dermatitis. 2016;75(3):191–2.
15. Valsecchi R, Leghissa P, Di Landro A, Bartolozzi F, Riva M, Bancone C. Persistent leukoderma after henna tattoo. Contact Dermatitis. 2007;56(2):108–9.
16. Gunasti S, Aksungur VL. Severe inflammatory and keloidal, allergic reaction due to para-phenylenediamine in temporary tattoos. Indian J Dermatol Venereol Leprol. 2010;76(2):165–7.
17. Bukhari IA. Cutaneous hyperpigmentation following nonpermanent henna tattoo. Saudi Med J. 2005;26(1):142–4.
18. Wohrl S, Hemmer W, Focke M, Gotz M, Jarisch R. Hypopigmentation after non-permanent henna tattoo. J Eur Acad Dermatol Venereol. 2001;15(5):470–2.
19. Ormerod E, Hughes TM, Stone N. Allergic contact dermatitis caused by resorcinol following a temporary black henna tattoo. Contact Dermatitis. 2017;77(3):187–8.
20. Sivam A, Tankersley M. Allergic contact dermatitis to henna tattoo with negative patch to p-phenylenediamine (PPD). J Allergy Clin Immunol Pract. 2019;7(1):288–9.
21. Ngwanya RM, Spengane Z, Khumalo N. Angioedema, an unusual reaction to hair dye. Pan Afr Med J. 2018;30:103.
22. Woo YR, Kim JS, Lim JH, et al. Acquired diffuse slate-grey facial dyspigmentation due to henna: an unrecognized cause of pigment contact dermatitis in Korean patients. Eur J Dermatol. 2018;28(5):644–8.
23. Davari P, Maibach HI. Contact urticaria to cosmetic and industrial dyes. Clin Exp Dermatol. 2011;36(1):1–5.
24. Rubegni P, Fimiani M, de Aloe G, Andreassi L. Lichenoid reaction to temporary tattoo. Contact Dermatitis. 2000;42(2):117–8.
25. Kheir A, Gaber I, Gafer S, Ahmed W. Life-threatening haemolysis induced by henna in a Sudanese child with glucose-6-phosphate dehydrogenase deficiency. East Mediterr Health J. 2017;23(1):28–30.

26. Raupp P, Hassan JA, Varughese M, Kristiansson B. Henna causes life threatening haemolysis in glucose-6-phosphate dehydrogenase deficiency. Arch Dis Child. 2001;85(5):411–2.
27. Sinha A, Goel L, Ranjan R, Gaba S, Kumar A. Atraumatic acute compartment syndrome of forearm following artificial mehndi (henna) dermatitis – a rare case report. J Clin Diagn Res. 2017;11(6):RD01–3.
28. Khine YY. Acute kidney injury following ingestion of henna leaf extract: a case report from Myanmar. Blood Purif. 2017;44(Suppl 1):41–5.
29. Guven SG. Dyspnea associated with henna stone: a rare cause of pediatric tracheotomy. Turk Arch Otorhinolaryngol. 2017;55(1):38–40.
30. Khanna N. Hand dermatitis in beauticians in India. Indian J Dermatol Venereol Leprol. 1997;63(3):157–61.
31. Lin LY, Chiou SC, Wang SH, Chi CC. Effects of facial threading on female skin texture: a prospective trial with physiological parameters and sense assessment. Evid Based Complement Alternat Med. 2019;2019:1535713.
32. Bloom MW, Carter EL. Bullous impetigo of the face after epilation by threading. Arch Dermatol. 2005;141(9):1174–5.
33. Abdel-Gawad MM, Abdel-Hamid IA, Wagner RF Jr. Khite: a non-Western technique for temporary hair removal. Int J Dermatol. 1997;36(3):217.
34. Halder S, Halder A. Verruca plana following eyebrow threading. Indian J Dermatol Venereol Leprol. 2009;75(2):196–7.
35. Kumar R, Zawar V. Threading warts: a beauty parlor dermatosis. J Cosmet Dermatol. 2007;6(4):279–82.
36. Sidharth S, Rahul A, Rashmi S. Cosmetic warts: pseudokoebnerization of warts after cosmetic procedures for hair removal. J Clin Aesthet Dermatol. 2015;8(7):52–6.
37. Ghosh SK, Bandyopadhyay D. Molluscum contagiosum after eyebrow shaping: a beauty salon hazard. Clin Exp Dermatol. 2009;34(7):e339–40.
38. Verma SB. Eyebrow threading: a popular hair-removal procedure and its seldom-discussed complications. Clin Exp Dermatol. 2009;34(3):363–5.
39. Verma SB. Vitiligo koebnerized by eyebrow plucking by threading. J Cosmet Dermatol. 2002;1(4):214–5.
40. Litak J, Krunic AL, Antonijevic S, Pouryazdanparast P, Gerami P. Eyebrow epilation by threading: an increasingly popular

procedure with some less-popular outcomes--a comprehensive review. Dermatol Surg. 2011;37(7):1051–4.
41. Lilly E, Kundu RV. Dermatoses secondary to Asian cultural practices. Int J Dermatol. 2012;51(4):372–9; quiz 379–382.
42. Mehta SS, Reddy BS. Cosmetic dermatitis – current perspectives. Int J Dermatol. 2003;42(7):533–42.
43. Tewary M, Ahmed I. Bindi dermatitis to 'chandan' bindi. Contact Dermatitis. 2006;55(6):372–4.
44. Laxmisha C, Nath AK, Thappa DM. Bindi dermatitis due to thimerosal and gallate mix. J Eur Acad Dermatol Venereol. 2006;20(10):1370–2.
45. Nath AK, Thappa DM. Kumkum-induced dermatitis: an analysis of 46 cases. Clin Exp Dermatol. 2007;32(4):385–7.
46. Annabathula A, Priya S, Srinivas CR. Kumkum-induced allergic contact dermatitis: are we missing the actual culprit? Indian J Dermatol Venereol Leprol. 2018;84(2):153–6.
47. Kozuka I, Goh CL, Doi T, Yioshikawa K. Sudan I as a cause of pigmented contact dermatitis in "kumkum" (an Indian cosmetic). Ann Acad Med Singap. 1988;17(4):492–4.
48. Kumar JV, Moideen R, Murugesh SB. Contactants in 'Kum-Kum' dermatitis. Indian J Dermatol Venereol Leprol. 1996;62(4):220–1.
49. Pandhi D, Vij A, Singal A. Contact depigmentation induced by propyl gallate. Clin Exp Dermatol. 2011;36(4):366–8.
50. Baxter KF, Wilkinson SM. Contact dermatitis from a nickel-containing bindi. Contact Dermatitis. 2002;47(1):55.
51. Dwyer CM, Forsyth A. Allergic contact dermatitis from bindi. Contact Dermatitis. 1994;30(3):174.
52. Bajaj AK, Gupta SC, Chatterjee AK. Contact depigmentation from free para-tertiary-butylphenol in bindi adhesive. Contact Dermatitis. 1990;22(2):99–102.
53. Chatierjee A, Bajaj AK, Gupta SC. Identification of a contact depigmenting agent in Indian bindi. Natl Med J India. 1991;4(3):113–5.
54. Mathur AK, Srivastava AK, Singh A, Gupta BN. Contact depigmentation by adhesive material of bindi. Contact Dermatitis. 1991;24(4):310–1.
55. Pandhi RK, Kumar AS. Contact leukoderma due to 'Bindi' and footwear. Dermatologica. 1985;170(5):260–2.
56. Bajaj AK, Govil DC, Bajaj S. Bindi depigmentation. Arch Dermatol. 1983;119(8):629.

57. Goyal S, Sajid N, Husain S. Contact dermatitis due to local cosmetics: a study from Northern India. Indian J Dermatol. 2019;64(6):461–4.
58. Singh P, Singh J, Agarwal US, Bhargava RK. Contact vitiligo: etiology and treatment. Indian J Dermatol Venereol Leprol. 2003;69(1):27–9.
59. Goh CL, Kozuka T. Pigmented contact dermatitis from 'kum-kum'. Clin Exp Dermatol. 1986;11(6):603–6.
60. Mishra G, Rathi S, Mulani J. Bindi tuberculosis – lupus vulgaris associated with bindi use: a case report. J Clin Diagn Res. 2015;9(5):Od04–5.
61. Kumar AS, Pandhi RK, Bhutani LK. Bindi dermatoses. Int J Dermatol. 1986;25(7):434–5.
62. Ramesh V. Foreign-body granuloma on the forehead: reaction to bindi. Arch Dermatol. 1991;127(3):424.
63. Verma SB. Dermatological signs in South Asian women induced by sari and petticoat drawstrings. Clin Exp Dermatol. 2010;35(5):459–61.
64. Kumara L, Rangaraj M, Karthikeyan K. Drawstring lichen planus: a unique case of Koebnerization. Indian Dermatol Online J. 2016;7(3):201–2.
65. Eapen BR, Shabana S, Anandan S. Waist dermatoses in Indian women wearing saree. Indian J Dermatol Venereol Leprol. 2003;69(2):88–9.
66. Stirn A. Body piercing: medical consequences and psychological motivations. Lancet. 2003;361(9364):1205–15.
67. Meltzer DI. Complications of body piercing. Am Fam Physician. 2005;72(10):2029–34.
68. Ladizinski B, Nutan FN, Lee KC. Nose piercing: historical significance and potential consequences. JAMA Dermatol. 2013;149(2):142.
69. Kumar Ghosh S, Bandyopadhyay D. Granuloma pyogenicum as a complication of decorative nose piercing: report of eight cases from eastern India. J Cutan Med Surg. 2012;16(3):197–200.
70. Kluger N, Gaudy-Marquestre C, Monestier S, Hesse S, Jacques Grob J, Aleth RM. Persistent telangiectatic erythema following nostril piercing. Int J Dermatol. 2014;53(2):e149–51.
71. Khundkar R, Wilson PA. Basal cell carcinoma at the site of a nasal piercing. J Plast Reconstr Aesthet Surg. 2009;62(4):557–8.
72. Roman J. African scarification. JAMA Dermatol. 2016;152(12):1353.

73. Tsiba JB, Mabiala-Babela JR, Lenga LI, et al. Scarification in children hospitalized in Congo. Med Trop (Mars). 2011;71(5):509–10.
74. Mammen L, Norton SA. Facial scarification and tattooing on Santa Catalina Island (Solomon Islands). Cutis. 1997;60(4):197–8.
75. Dunyo SK, Ahorlu CK, Simonsen PE. Scarification as a risk factor for rapid progression of filarial elephantiasis. Trans R Soc Trop Med Hyg. 1997;91(4):446.
76. Hrdy DB. Cultural practices contributing to the transmission of human immunodeficiency virus in Africa. Rev Infect Dis. 1987;9(6):1109–19.
77. Ayoola EA. Infectious diseases in Africa. Infection. 1987;15(3):153–9.
78. Alabi GO, George AO. Cutaneous sarcoidosis and tribal scarifications in West Africa. Int J Dermatol. 1989;28(1):29–31.
79. Kaatz M, Elsner P, Bauer A. Body-modifying concepts and dermatologic problems: tattooing and piercing. Clin Dermatol. 2008;26(1):35–44.
80. Babatunde OP, Oyeronke AE. Scarification practice and scar complications among the Nigerian Yorubas. Indian J Dermatol Venereol Leprol. 2010;76(5):571–2.
81. Kamagaju L, Morandini R, Gahongayire F, et al. Survey on skin-lightening practices and cosmetics in Kigali, Rwanda. Int J Dermatol. 2016;55(1):45–51.
82. Petit A, Cohen-Ludmann C, Clevenbergh P, Bergmann JF, Dubertret L. Skin lightening and its complications among African people living in Paris. J Am Acad Dermatol. 2006;55(5):873–8.
83. Ho YB, Abdullah NH, Hamsan H, Tan ESS. Mercury contamination in facial skin lightening creams and its health risks to user. Regul Toxicol Pharmacol. 2017;88:72–6.
84. Cristaudo A, D'Ilio S, Gallinella B, et al. Use of potentially harmful skin-lightening products among immigrant women in Rome, Italy: a pilot study. Dermatology. 2013;226(3):200–6.
85. Hollick EJ, Igwe C, Papamichael E, et al. Corneal and scleral problems caused by skin-lightening creams. Cornea. 2019;38(10):1332–5.
86. Dlova NC, Hamed SH, Tsoka-Gwegweni J, Grobler A. Skin lightening practices: an epidemiological study of South African women of African and Indian ancestries. Br J Dermatol. 2015;173(Suppl 2):2–9.

87. Draelos ZD. Skin lightening preparations and the hydroquinone controversy. Dermatol Ther. 2007;20(5):308–13.
88. Oliveira A, Amaro C, Cardoso J. Allergic contact dermatitis caused by sodium metabisulphite in a cosmetic bleaching cream. Australas J Dermatol. 2015;56(2):144–5.
89. Garcia-Gavin J, Gonzalez-Vilas D, Fernandez-Redondo V, Toribio J. Pigmented contact dermatitis due to kojic acid. A paradoxical side effect of a skin lightener. Contact Dermatitis. 2010;62(1):63–4.
90. Suzuki K, Yagami A, Matsunaga K. Allergic contact dermatitis caused by a skin-lightening agent, 5,5′-dipropylbiphenyl-2,2′-diol. Contact Dermatitis. 2012;66(1):51–2.
91. Gohara M, Yagami A, Suzuki K, et al. Allergic contact dermatitis caused by phenylethyl resorcinol [4-(1-phenylethyl)-1,3-benzenediol], a skin-lightening agent in cosmetics. Contact Dermatitis. 2013;69(5):319–20.
92. Mamodaly M, Dereure O, Raison-Peyron N. A new case of allergic contact dermatitis caused by 3-o-ethyl ascorbic acid in facial antiageing cosmetics. Contact Dermatitis. 2019;81(4):315–6.
93. Dilokthornsakul W, Dhippayom T, Dilokthornsakul P. The clinical effect of glutathione on skin color and other related skin conditions: a systematic review. J Cosmet Dermatol. 2019;18(3):728–37.
94. Hamann CR, Boonchai W, Wen L, et al. Spectrometric analysis of mercury content in 549 skin-lightening products: is mercury toxicity a hidden global health hazard? J Am Acad Dermatol. 2014;70(2):281–287.e283.
95. Iwegbue CM, Bassey FI, Tesi GO, Onyeloni SO, Obi G, Martincigh BS. Safety evaluation of metal exposure from commonly used moisturizing and skin-lightening creams in Nigeria. Regul Toxicol Pharmacol. 2015;71(3):484–90.
96. del Giudice P, Yves P. The widespread use of skin lightening creams in Senegal: a persistent public health problem in West Africa. Int J Dermatol. 2002;41(2):69–72.
97. Tatebayashi M, Oiso N, Wada T, Suzuki K, Matsunaga K, Kawada A. Possible allergic contact dermatitis with reticulate postinflammatory pigmentation caused by hydroquinone. J Dermatol. 2014;41(7):669–70.
98. Numata T, Kobayashi Y, Ito T, Harada K, Tsuboi R, Okubo Y. Two cases of allergic contact dermatitis due to skin-whitening cosmetics. Allergol Int. 2015;64(2):194–5.

99. Numata T, Tobita R, Tsuboi R, Okubo Y. Contact dermatitis caused by arbutin contained in skin-whitening cosmetics. Contact Dermatitis. 2016;75(3):187–8.
100. Lecamwasam KL, Lim TM, Fuller LC. Tinea incognito caused by skin-lightening products. J Eur Acad Dermatol Venereol. 2016;30(3):480–1.
101. Yagami A, Suzuki K, Sano A, et al. Rhododendrol-induced leukoderma accompanied by allergic contact dermatitis caused by a non-rhododendrol skin-lightening agent, 5,5′-dipropylbiphenyl-2,2′-diol. J Dermatol. 2015;42(7):739–40.
102. Faye O, Dicko AA, Berthe S, et al. Squamous cell carcinoma associated with use of skin-lightening cream. Ann Dermatol Venereol. 2018;145(2):100–3.
103. Totri CR, Diaz L, Matiz C, Krakowski AC. A 15-year-old girl with painful, peeling skin. Pediatr Ann. 2015;44(5):195–7.
104. Olumide YM, Akinkugbe AO, Altraide D, et al. Complications of chronic use of skin lightening cosmetics. Int J Dermatol. 2008;47(4):344–53.
105. Scheinfeld N. Tattoos and religion. Clin Dermatol. 2007;25(4):362–6.
106. Telang GH, Ditre CM. Blue gingiva, an unusual oral pigmentation resulting from gingival tattoo. J Am Acad Dermatol. 1994;30(1):125–6.
107. Islam PS, Chang C, Selmi C, et al. Medical complications of tattoos: a comprehensive review. Clin Rev Allergy Immunol. 2016;50(2):273–86.
108. Kluger N. Cutaneous and systemic complications associated with tattooing. Presse Med. 2016;45(6 Pt 1):567–76.