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ORIGINAL ARTICLE

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Photodocumentation in skin of color

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Abstract

Photodocumentation is an important tool utilized across medical specialties and plays an especially pivotal role in dermatology given the visual nature of the field. Although it has been well-established that dermatologic diseases manifest differently in dark skin compared to light skin, there is under-representation of images of dark skin in dermatology textbooks and other educational resources. It is essential for dermatologists to work toward increasing the availability of images of dermatologic disease in dark skin by improving their own ability to successfully photograph dark-skinned patients. In this article, we describe our nuanced approach to photographing skin of color in regards to the ideal background type, lighting, and camera settings.

KEYWORDS

dermatology/instrumentation, dermatology/methods, lighting, photography/methods, skin diseases/diagnostic imaging

1 | INTRODUCTION

Photodocumentation (medical photography) is an invaluable tool for clinical documentation, monitoring treatment progress, teleconsultation, research, publication and education. In an era of smartphones and tablets, there are now more ways than ever before to take clinical photos. Despite this, studies show there is a paucity of ethnic skin images in the research setting and core dermatology educational resources.[1] Therefore, there is a need for both standardization in medical photography to ensure high-quality images and to provide quality photographs across diverse skin types.

A significant proportion of dermatologists report insufficient exposure to Fitzpatrick skin types IV-VI or education on ethnic skin during residency training and as a result, lack confidence in diagnosing and treating skin disease in these patients.[1,2] This is an important consideration, since dermatologic diseases can vary in prevalence and presentation in different race and ethnic groups. Notably, atopic dermatitis is reported to have a higher prevalence in African American and Asian patients and may lack classic findings in white skin such as obvious erythema.[3] In Asian patients, it may present with clearer demarcation of lesions, scaling, and lichenification, while in African American patients it may appear more purple, brown, or gray and be associated with post-inflammatory hyper or hypopigmentation.[4,5]

To correct disparities in dermatologic education and educational resources, dermatologists must advocate for more inclusivity in photodocumentation of dark and ethnic skin. In this article, we will discuss important terms and concepts in the context of medical photography, techniques to take high-quality clinical photographs of various Fitzpatrick skin types with different levels of equipment, and special considerations when photographing skin of color in the pediatric population.

2 | EXPOSURE

The exposure of a photograph dictates photographic brightness and is determined by 3 main features: aperture (f-stop; lower number increases exposure), shutter speed (faster speed decreases exposure), and ISO (light sensitivity, increased value promotes brightness). Balancing between the three helps adjust the brightness to different conditions. Smartphones may have some limitations in adjusting exposure compared to SLR cameras. The majority of smartphone

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cameras have a fixed aperture, and a few newer models offer up to three sizes. However, ISO and shutter speeds can be adjusted on smartphones, either through the manual mode built into the original phone camera app (more common in modern Android smartphones) or a third-party app. When photographing dark skin, it is essential to adjust exposure to avoid making the patient appear too dark or too light. Light skin reflects more light, while dark skin absorbs more light. As a result, slightly overexposing when photographing dark skin by increasing the aperture (lower-number f-stop), reducing shutter speed, or increasing the ISO increases the amount of light reaching the camera sensor and results in adequate exposure. When adjusting settings however, one should be cautious of extreme overexposure, in which decreasing the shutter speed <1/100 seconds may increase the likelihood of a blurry image caused by patient or photographer movement, and increasing the ISO too much can result in a grainy appearance and can decrease image quality.

3 | LENSES AND ZOOM

For the purposes of medical photography, if using an SLR, we recommend using a prime lens, which has a fixed focal length and takes sharper images than a zoom lens. In our practice, we have found a 60mm macro lens to be most effective. A prime lens allows the photographer to maintain consistency when conducting serial photography and as a result, provides photographs that can be used to make accurate comparisons. Using a zoom lens requires the photographer to ensure that the focal length is consistent when conducting serial photography, which needlessly adds an additional variable. Importantly, the angle of the lens should be kept perpendicular to the subject and the distance from which the photograph is captured kept consistent.

Most smartphones/tablets have a wide-angle lens, which can unnaturally stretch areas close to the edge of the frame, making them appear wider than in reality. In order to avoid this distortion, it is important to maintain distance and utilize the zoom capability of the device rather than getting physically closer to the subject. Getting too close can cause spherical distortion of the subject matter. This can make a lesion look larger than it actually is (Figure 1) or distort the patient's face shape when taking a close-up image. Importantly, the photographer should be mindful that zooming in more than halfway of the smartphone/tablet's zoom capability may compromise the quality of the image.

4 | PHOTOGRAPH BACKGROUND

The background is an important feature of a photograph as it can distort the brightness and color perceived in the foreground, also referred to as "color contamination."[6,7] The background should remain constant between photographs along a timeline and have minimal distractions. We recommend using a mono-colored cloth as a draping and avoiding patterned or reflective material. Medical photography classically utilizes a royal blue color background. Other options recommended in literature include black, gray, and white.[7,8] An ideal background provides the highest contrast to the subject.[6] From our experience, black is optimal for Fitzpatrick type I-III skin, while white and gray are more optimal background choices for Fitzpatrick type IV-VI skin due to the greater contrast and additional light reflected onto the subject (Figure 2). We recommend that royal blue be avoided for the purposes of dermatological photography, due to the resulting color cast. An option for consistent photography is having a gray cloth with holes that can be hooked to the wall.

5 | LIGHTING

Adequate lighting is essential in taking a high-quality clinical image. Light source and lighting position are both important to consider when photographing skin of color. Lighting and camera settings should be adjusted to allow as much light as possible, while avoiding excessive overexposure or washout of details. Overall, consistency

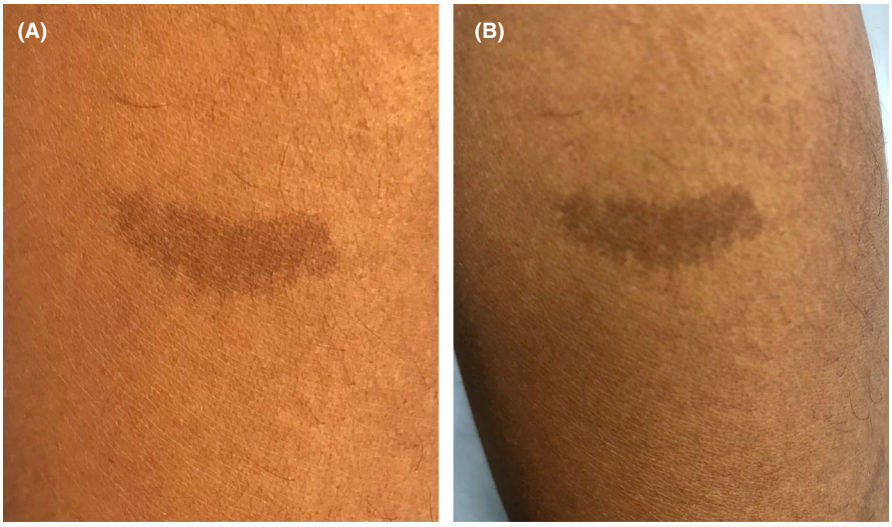

FIGURE 1 Taken using iPhone X. (A) Stepping away from the subject and utilizing the camera's zoom feature results in a clear image, while (B) moving the camera physically closer to the subject results in spherical distortion of the lesion and an unfocused image.

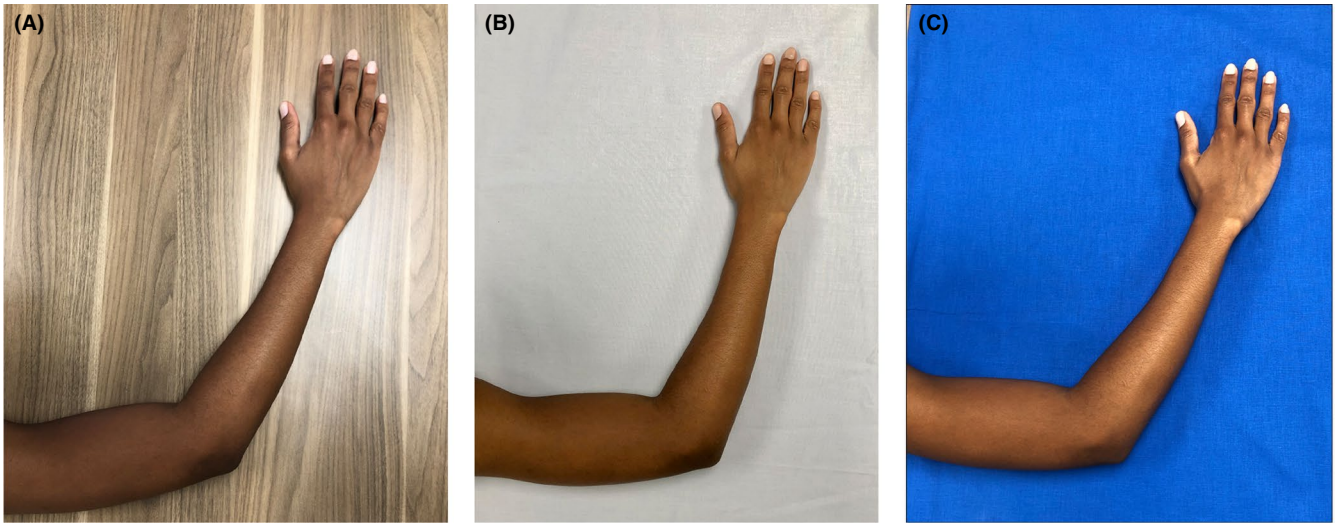

FIGURE 2 Taken using iPhone X. (A) Background with a distracting pattern. (B) Mono-colored gray background providing ideal contrast. (C) Royal blue background causing color contamination.

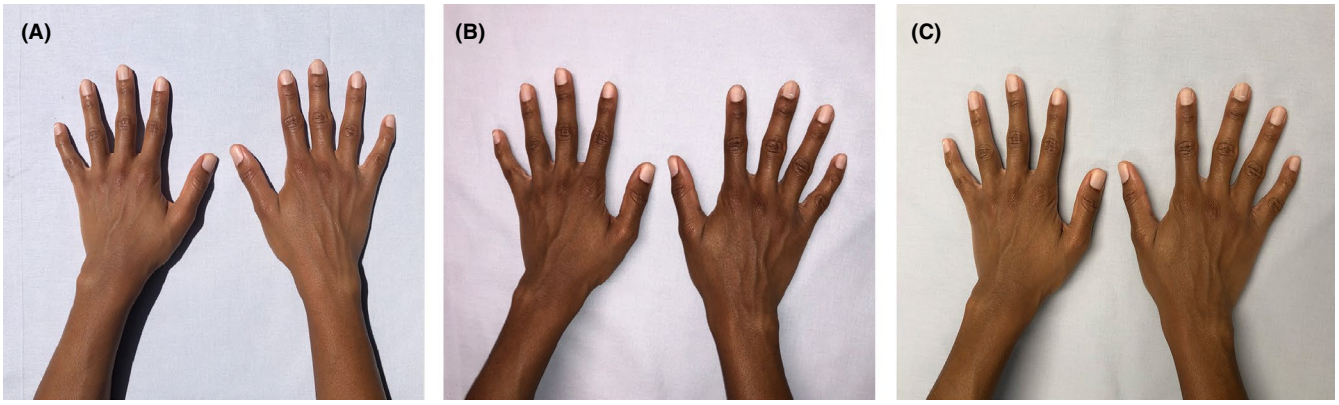

FIGURE 3 Taken using iPhone X. (A) Natural light. (B) Flash photography. (C) Room light.

is key when conducting serial photodocumentation to ensure that before and after photographs can accurately be compared. The ideal setup to guarantee consistent lighting is a room dedicated for the purposes of medical photography, with two soft light sources placed at 45-degree angles from the camera. If this is not possible, maintaining consistency of lighting can be as simple as using the same camera settings when conducting serial photodocumentation of a patient or photographing the patient in the same room each time.

If using a smartphone or tablet, we recommend using a natural light source if possible when photographing dark skin, which can be achieved by photographing the patient in a room with a window (Figure 3A). If using an SLR camera, in addition to adjusting the f-stop, shutter speed, and ISO to increase exposure as discussed previously, flash should be utilized on automatic mode. The flash unit should be paired with a flash diffuser and angled such that the light bounces off a white surface, such as a white ceiling, on to the subject. Direct flash photography should be avoided, as it can result in harsh light that white-washes darker skin tones, diminishes fine details, and results in prominent shadows (Figure 3B). Alternative light sources including overhead light or flashlights can also be used. Light modifiers such as soft boxes or flash diffusers may be utilized to soften or evenly distribute light. Overhead light can be useful especially in highlighting afro-textured hair.[6] It may be beneficial to take both a photograph with flash and without flash, as the former is useful for demonstrating texture in follicular and raised lesions, while the latter better demonstrates pigment and distribution.

Room light can distort natural skin tones, causing a color cast that gives the patient's skin an artificial warm overtone (Figure 3C). SLR cameras on an automatic setting attempt to correct for color casting by automatically adjusting the white balance. White balance adjusts camera settings to make the color white actually appear white in a photograph. However, automatic white balance settings can inaccurately depict skin tones, particularly dark skin tones. White balance can be manually adjusted in SLR cameras and some smartphones by taking a photograph of a plain white or light gray background such as the wall or a cloth in the same lighting setting, navigating to the "custom white balance" setting of the camera, and setting the aforementioned photograph as the reference photograph.

6 | CONSENT

It is important to obtain patient (and guardian) consent before taking photographs, as there are important ethical and legal issues implicated with patient privacy. Specific photograph consent must be requested for teaching or publication. Historically, there have been proposed differences in physician distrust between different races and ethnicities, with African Americans reporting less trust in health care providers, specifically with concerns about personal privacy and potential for harmful experimentation in hospitals.[9,10] However, other studies have demonstrated low trust is more associated with low-quality interactions with health care providers and a combination of sociodemographic variables including lower socioeconomic status than race/ethnicity.[10,11] These factors can be kept in mind when introducing photodocumentation to the patient or guardian. From our experiences, there is typically no difference in likelihood of consent between different groups, and photography is accepted by patients when the conversation is approached with open, transparent communication.

7 | CONCLUSION

Photography is routinely used in dermatology and having a consistent standardized method of approach is crucial to maintaining the integrity and reliability of the images. However, a recent survey of dermatologists reported only 23.7% adhering to a photography protocol, with many expressing interest in more photography training.[12] Proper photodocumentation is an essential part of quality patient care, and a basic understanding of photography fundamentals, along with a standardized method of approach, can aid in management decisions, enhance patient care, and increase both patient and provider satisfaction.[12]

Overall, there are a few aspects of medical photography that may be adjusted when taking photos for children and skin of color. Understanding the fundamentals to photography, including camera settings, background, lighting, and photograph framing, is the first step to ensuring proper photographing in all situations, for all types of patients. Given the dynamic nature of photography and available technologies, practices will likely evolve over time, and this topic should be frequently revisited to ensure quality photodocumentation and hence quality education, research, and patient care for dermatologic disease in skin of color.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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REFERENCES

1. Buster KJ, Stevens EI, Elmets CA. Dermatologic health disparities. *Dermatol Clin*. 2012;30(1):53-59. viii. doi:https://doi.org/10.1016/j.det.2011.08.002
2. Nijhawan RI, Jacob SE, Woolery-Lloyd H. Skin of color education in dermatology residency programs: does residency training reflect the changing demographics of the United States? *J Am Acad Dermatol*. 2008;59(4):615-618. doi:https://doi.org/10.1016/j.jaad.2008.06.024
3. Shaw TE, Currie GP, Koudelka CW, Simpson EL. Eczema prevalence in the United States: data from the 2003 national survey of children's health. *J Invest Dermatol*. 2011;131(1):67-73. doi:https://doi.org/10.1038/jid.2010.251
4. Noda S, Suarez-Farinas M, Ungar B, et al. The Asian atopic dermatitis phenotype combines features of atopic dermatitis and psoriasis with increased TH17 polarization. *J Allergy Clin Immunol*. 2015;136(5):1254-1264. doi:https://doi.org/10.1016/j.jaci.2015.08.015
5. Ruiz-Maldonado R, Orozco-Covarrubias ML. Postinflammatory hypopigmentation and hyperpigmentation. *Semin Cutan Med Surg*. 1997;16(1):36-43. doi:https://doi.org/10.1016/s1085-5629(97)80034-x
6. Lester JC, Clark L Jr, Linos E, Daneshjou R. Clinical photography in skin of colour: tips and best practices. *Br J Dermatol*. 2021;184(6):1177-1179. doi:https://doi.org/10.1111/bjd.19811
7. Prantl L, Brandl D, Ceballos P. A proposal for updated standards of photographic documentation in aesthetic medicine. *Plast Reconstr Surg Glob Open*. 2017;5(8):e1389. doi:https://doi.org/10.1097/gox.0000000000001389
8. Hexsel D, Hexsel CL, Dal'Forno T, et al. Standardized methods for photography in procedural dermatology using simple equipment. *Int J Dermatol*. 2017;56(4):444-451.
9. Halbert CH, Armstrong K, Gandy OH Jr, Shaker L. Racial differences in trust in health care providers. *Arch Intern Med*. 2006;166(8):896-901. doi:https://doi.org/10.1001/archinte.166.8.896
10. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. *Public Health Rep*. 2003;118(4):358-365. doi:https://doi.org/10.1093/phr/118.4.358
11. Armstrong K, Ravenell KL, McMurphy S, Putt M. Racial/ethnic differences in physician distrust in the United States. *Am J Public Health*. 2007;97(7):1283-1289. doi:https://doi.org/10.2105/ajph.2005.080762
12. Milam EC, Leger MC. Use of medical photography among dermatologists: a nationwide online survey study. *J Eur Acad Dermatol Venereol*. 2018;32(10):1804-1809. doi:https://doi.org/10.1111/jdv.14839

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