Representation of Skin of Color in Rheumatology Educational Resources

Chay Bae[1] , Michael Cheng[1], Christina N. Kraus[2] , and Sheetal Desai[1]

ABSTRACT. **Objective.** To investigate the availability of images representing Black, Indigenous, and people of color in rheumatology educational resources.
Methods. Color images were collected from 5 major educational resources and cataloged by the resources they came from, underlying rheumatic conditions, and skin type. Fitzpatrick skin type (FST) was used to categorize images into "light," "dark," or "indeterminate." The images were initially scored by a fellow in the Division of Rheumatology and subsequently validated by a faculty member from the Department of Dermatology.
Results. Of the thousands of images reviewed, 1604 images met study criteria. FST validation from the Department of Dermatology resulted in the recoding of 111 images. The final scoring revealed 86% of the images to be light skin, 9% of images to be dark skin, and 5% of images to be indeterminate.
Conclusion. The paucity of dark skin images in rheumatology resources is incongruent with current diversity estimates in the US. Significant efforts should be made to incorporate images of Black, Indigenous, and people of color into educational resources.

Key Indexing Terms: education, ethnic groups, racism, rheumatology

Health inequities in the United States disproportionately affect Black, Indigenous, and people of color (BIPOC).[1] Projections show that by the year 2045, over half of the US population will belong to a minority group.[2] In the face of shifting demographics, leaders in health care must examine how to evolve with these changing times. Awareness of diagnostic differences in skin color begins with medical education. Studies have found that implicit bias is ingrained in the current curriculum,[3] which ultimately affects patient care. Researchers have revealed that practitioners felt less confident in assessing the rash of BIPOC patients with systemic lupus erythematosus (SLE).[4] The physical exam findings in the field of rheumatology encompass some of the rarest disease entities and are often underappreciated to the untrained eye. To better understand how health professionals are trained in identifying physical exam findings in rheumatology, we examined the representation of skin type in several key educational resources with reaffirmation from the Department of Dermatology.

METHODS

The American College of Rheumatology (ACR) fellows' board preparation survey (2017) served as guidance in determining the educational resources

[1]C. Bae, DO, Fellow, M. Cheng, DO, Assistant Professor, S. Desai, MD, Associate Professor, Division of Rheumatology, Department of Medicine, University of California Irvine; [2]C.N. Kraus, MD, Assistant Professor, Department of Dermatology, University of California Irvine, Irvine, California, USA.

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Address correspondence to Dr. C. Bae, Division of Rheumatology, 333 City Blvd. West, Suite 400 City Tower, Suite 400, ZC4072 Orange, CA 92868-3298, USA. Email: chaybae.do@gmail.com.

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evaluated in this study.[5] Data was gathered from 5 prominent educational sources: ACR Rheumatology Image Library,[6] an online image bank sponsored by the ACR; *Kelley and Firestein's Textbook of Rheumatology*,[7] 11th edition; *Rheumatology*, 6th edition, by Hochberg et al[8]; West and Kolfenbach's *Rheumatology Secrets*,[9] 4th edition; and *Washington Manual Rheumatology Subspecialty Consult*, 3rd edition, by Gonzalez et al.[10] Since the electronic versions contained additional color images, they were chosen for review in lieu of the hardcopy textbooks.

Two primary coders examined and interpreted the images from each source. Images were reviewed by a coder from the Division of Rheumatology (CB) and then validated by a master coder from the Department of Dermatology (CK). In the event of a coding discrepancy, the dermatologist coder gave the final scoring.

Images were assessed using methodology established by Ebede and Papier.[11] First, each image was screened for the content provided and whether or not it was a color image portraying skin. Figure text was initially avoided to minimize bias. If the image was screened as appropriate for the study, then an initial determination of "light," "dark," or "indeterminate" was made. Fitzpatrick skin type (FST) was used as the basis to categorize the images into light (FST I–IV) and dark (FST V–VI) skin. An FST of V was used as the entry criterion for dark skin categorization, as classically V and VI represent brown and black skin color.[12] Thereafter, figure text could be used to make a further determination, if required. Images were categorized as indeterminate if these could not be categorized into light or dark. Such situations included dim-lit pictures, images where pathology obscured adjacent skin, and close-up images without additional context (e.g., palms and soles, nails, oral mucosa, and genitalia). Images of the same individual taken at a different angle were included, as these additional images elucidated a new educational point. Repeated images and black-and-white images were excluded. After final skin type determination was made, figure text and chapter placement were used to categorize the condition and/or teaching point being presented in each image.

RESULTS

One thousand six hundred four images met study criteria and

were independently scored by 2 coders. There were 111 images that had discrepancies in skin type coding (Figure 1). Among the 111 recoded images, the most frequently encountered disease entities were scleroderma (16%, n = 18), SLE (10%, n = 11); dermatomyositis (DM; 7%, n = 8); rheumatoid arthritis (RA; 6%, n = 7), and psoriatic arthritis (PsA; 5%, n = 6).

Of the validated 1604 images (Table 1), 1381 were light skin, 145 were dark skin, and 78 were indeterminate. Broken down by educational resource, the ACR Rheumatology Image Library contained 697 light skin images, 106 dark skin images, and 53 indeterminate images. Hochberg et al contained 423 light skin images, 17 dark skin images, and 22 indeterminate images. *Kelley and Firestein* contained 255 light skin images, 19 dark skin images, and 3 indeterminate images. *Rheumatology Secrets* contained 6 light skin images, 3 dark skin images, and 0 indeterminate images. *Washington Manual* contained no images that met study criteria.

When categorized by the primary disease process, the majority of diseases were represented by light skin images, with the notable exception being sarcoidosis (Figure 2). The most indexed diseases were scleroderma, vasculitis, SLE, DM, RA, gout, and PsA. The percentile of images categorized as dark skin was 13% (16/128) for scleroderma, 6% (7/125) for vasculitis, 18% (21/119) for SLE, 5% (6/110) for DM, 2% (2/110) for RA, 9% (7/80) for gout, and only 2% (1/66) for PsA. In sarcoidosis, 60% (19/32) of the images were categorized as dark skin.

DISCUSSION

Currently, non-White people represent over 20% of the US population, and by the year 2044 are projected to represent over 50% of the population.[2] Our study found that out of the 1604 validated images, only 145 images (9%) could be categorized as dark skin: ACR Rheumatology Image Library (n = 106), *Kelley and Firestein* (n = 19), Hochberg et al (n = 17), *Rheumatology Secrets* (n = 3), and *Washington Manual* (n = 0). The aggregate 9% of dark skin images represent neither the current demographics of the US nor the patient panels that rheumatologists care for.

BIPOC populations are known to carry high prevalence rates of rheumatic conditions, yet their depiction in educational resources is sparse. In SLE for instance, registries reveal that annual prevalence is higher among Black than White patients in the states of Michigan (Washtenaw and Wayne Counties: 111.6 vs 47.5 per 100,000 people), and Georgia (DeKalb and Fulton Counties: 128.0 vs 39.9 per 100,000 people).[13] The cumulative prevalence of SLE in Indigenous populations from the states of Alaska, Arizona, Oklahoma (178 per 100,000 people), is thought to be comparable to Black populations.[13] Additionally, SLE prevalence is higher among Asian Americans than White populations in the states of California (San Francisco: 90.5 vs 55.2 per 100,000 people) and New York (Manhattan: 56.2 vs 34.7 per 100,000 people).[13] Despite the nuanced detail collected through SLE registries, only 18% (21/119) of SLE images are represented by dark skin. In DM, a recent study revealed that the prevalence of DM and polymyositis was higher in both non-Hispanic Black and Hispanic patients when compared to non-Hispanic White patients[14]; however, only 5% (6/110) of DM images were of dark skin. Some of the highest rates of RA have been recorded in the Indigenous populations of the Pima and Papago Native Americans in Arizona,[15] yet only 2% (2/110)
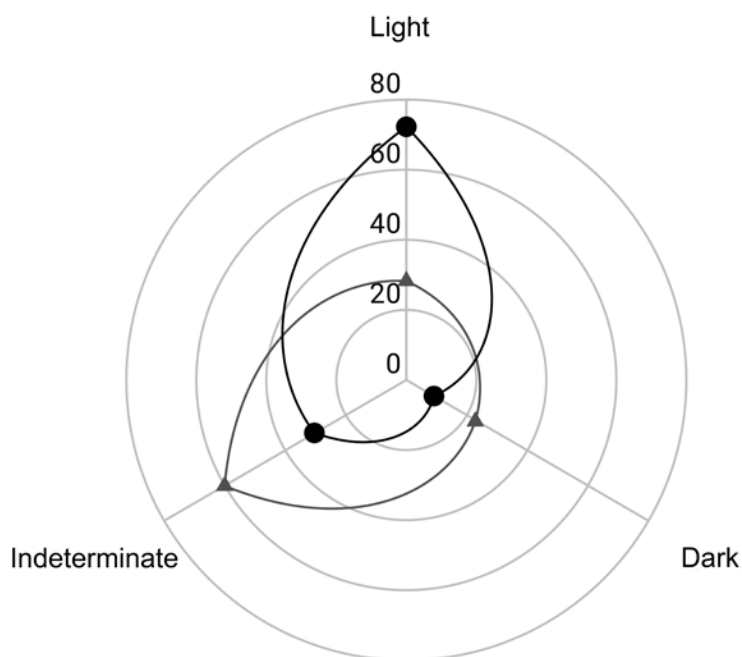

Figure 1. Coding discrepancies in skin typing (n = 111). ▲The preliminary coded images by coder CB: 28 images were coded as light skin type, 23 as dark skin type, and 60 as indeterminate. ●The final recoded images by coder CK: 72 were coded as light skin type, 9 as dark skin type, and 30 as indeterminate.

Table 1. Depiction of skin type from each educational resource (n = 1604).

Educational Source	N	Light Skin Type*	Dark Skin Type**	Indeterminate
All resources	1604	86 (1381)	9 (145)	5 (78)
ACR Rheumatology Image Library[6]	856	82 (697)	12 (106)	6 (53)
Hochberg et al[8]	462	91 (423)	4 (17)	5 (22)
Kelley and Firestein[7]	277	92 (255)	7 (19)	1 (3)
Rheumatology Secrets[9]	9	67 (6)	33 (3)	0
Washington Manual[10]	0	0	0	0

Values are expressed as % (n). * Light skin type defined by FST I–IV. ** Dark skin type defined by FST V–VI. FST: Fitzpatrick skin type.
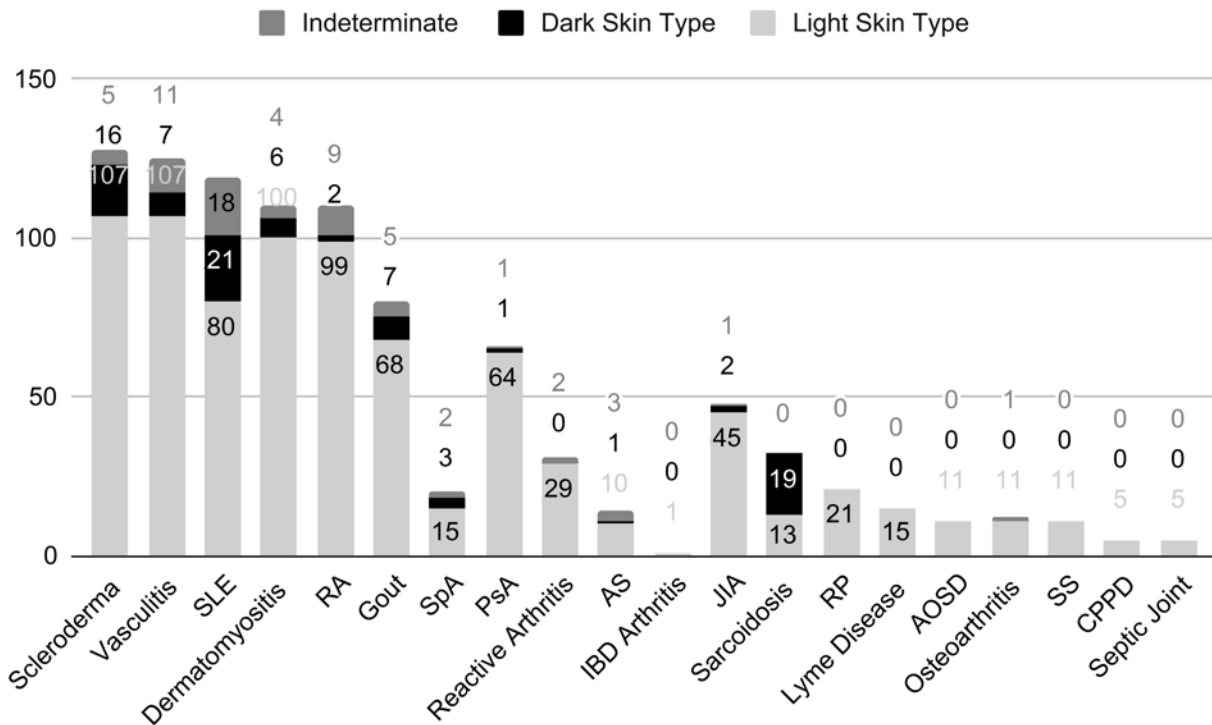

Figure 2. Depiction of disease entity by skin type (n = 964). The X-axis displays a selected number of frequently encountered disease entities in rheumatology. The Y-axis represents cumulative images by skin types. When appropriate, both adult and pediatric images were placed under the same category. Scleroderma includes forms of localized sclerosis, linear sclerosis, limited sclerosis, and systemic sclerosis. Vasculitis includes images defined by the 2012 revised International Chapel Hill Consensus Conference Nomenclature of Vasculitides. SpA was used for images without further categorization. JIA includes the 7 subtypes of systemic, oligoarticular, polyarticular (RF-positive), polyarticular (RF-negative), psoriatic, enthesitis-related, and undifferentiated. AOSD: adult-onset Still disease; AS: ankylosing spondylitis; CPPD: calcium pyrophosphate deposition disease; IBD arthritis: inflammatory bowel disease–associated arthritis; JIA: juvenile idiopathic arthritis; PsA: psoriatic arthritis; RA: rheumatoid arthritis; RF: rheumatoid factor; RP: relapsing polychondritis; SLE: systemic lupus erythematosus; SpA spondyloarthropathy; SS: Sjögren syndrome.

images were of dark skin. Racial minorities in the US have a high prevalence of gout[16] but only 9% (7/80) of images were of dark skin. The contrast between the prevalence of disease in BIPOC populations and how infrequently they are depicted in educational resources is an area of unmet need.

In addition to high prevalence rates, BIPOC populations are known to carry increased levels of disease activity. In scleroderma, African Americans have early disease onset and carry more severe disease phenotypes, with increased risk of scleroderma renal crisis and pulmonary fibrosis.[17] Out of all the reviewed images, however, only 13% (16/128) of scleroderma images were of dark skin. In vasculitis, Hispanic populations with antineutrophil cytoplasmic autoantibody–associated vasculitis are known to present with more severe disease and higher damage indices,[18] yet only 6% (7/125) of vasculitis images were of dark skin. Regarding psoriasis (PsO) and PsA, it is known that Asian and Hispanic populations present with more severe PsO when compared to White counterparts.[19] Nonetheless, only 1 out of 66 images of PsA were of dark skin. Rheumatic conditions can present differently in patients with darker skin types; thus,

knowledge of various presentations in deeply pigmented skin is important as it has diagnostic, therapeutic, and prognostic implications.

The one disease entity where dark skin represented the majority of images was sarcoidosis, with 60% (19/32) of images. It is known that African American populations carry some of the highest prevalence rates of sarcoidosis[20]; however, Nordic populations are also known to carry a high prevalence rate.[20] Despite both of these populations carrying a high prevalence of sarcoidosis, in medical education in North America, the classic depiction of a patient with sarcoidosis is in Black patients.[21] These racial associations are meant to serve as diagnostic clues; but rather, they compound implicit bias and represent patterns that do not necessarily depict reality.[22] In light of shifting demographics and growing conversations about BIPOC representation, racially biased illness scripts should be avoided.

A strength of our study is the interdisciplinary collaboration between Rheumatology and Dermatology. Collaboration within the rheumatology healthcare team is becoming the benchmark of care and has led to a joint statement from the ACR and the Association of Rheumatology Health Professionals (ARHP).[23] In concurrence with this joint statement, we felt that studying skin color representation in rheumatology educational resources was a unique opportunity for an interdisciplinary effort. In this study, the coder from the Department of Dermatology was designated as a master coder, as dermatologists are trained to categorize skin type and regularly do so in clinical practice and research settings. The employment of 2 primary coders—1 coder from the Division of Rheumatology and 1 master coder from the Department of Dermatology—allowed us to corroborate our findings. Further, through our methodology, we identified 111 images with discrepancies in skin type coding (Figure 1). Scleroderma, SLE, DM, RA, and PsA, respectively, were the most prevalent in the recoding process and highlight natural starting points in the efforts of building more inclusive educational resources. Our collective effort served to both validate the data being presented and create an inclusive methodology that reflects the joint statement put forth by the ACR and ARHP. Future concerted efforts between the 2 fields of medicine would help build educational resources that are more representative of the patients seen in practice, help mitigate skin type bias in image selection, and identify the most educationally informative images.

A limitation of this study is the use of FST as a surrogate marker of racial and ethnic representation. FST was originally intended to assess skin's response to ultraviolet light[12] and is an imperfect method of capturing BIPOC representation in educational resources. Unfortunately, it is the most readily available method for classifying the skin type of images and has been used as a surrogate marker of race and ethnicity since best described by Ebede and Papier.[11] An ideal methodology would describe not only the data by FST but also race and ethnicity. Unfortunately, this level of data was rarely provided in the educational resources that were reviewed.

Our findings are in accordance with, and expand upon, a recently published study[24] highlighting that darker skin tones were significantly underrepresented in rheumatology clinical resources. Our study evaluated key educational resources highlighted by rheumatology fellows[5] and sought validation of the FST scoring with colleagues in the Department of Dermatology. The addition of our study reverberates the importance of this issue and amplifies an area of unmet need.

Our findings corroborate the need for current and future leaders in rheumatology to incorporate imagery that reflects the diverse patients we serve. Herein, we propose several actions: (1) collaboration between Rheumatology and Dermatology at both the community and national levels; (2) the development of a taskforce to help identify and incorporate images from marginalized populations into educational resources; (3) the utilization of juxtaposition and side-by-side displays to depict how disease states can vary in contrasting skin types; and (4) the deployment of future studies that evaluate additional resources, such as continuing medical education materials and journals.

In conclusion, BIPOC populations are underrepresented in premier rheumatology education resources. This has real-world repercussions for the patients who are entrusted to our care. We recognize the valiant efforts in rheumatology to create meaningful educational resources. This study is not meant to castigate any particular resource. Rather, we hope this study can be viewed as a call to action. The time to enact change is now.

REFERENCES

1. Bailey ZD, Krieger N, Agénor M, Graves J, Linos N, Bassett MT. Structural racism and health inequities in the USA: evidence and interventions. Lancet 2017;389:1453-63.
2. Vespa J, Medina L, Armstrong D. Demographic turning points for the United States: population projections for 2020 to 2060. [Internet. Accessed October 14, 2021.] Available from: https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1144.pdf
3. Amutah C, Greenidge K, Mante A, et al. Misrepresenting race – the role of medical schools in propagating physician bias. N Engl J Med 2021;384:872-8.
4. Kannuthurai V, Murray J, Zickuhr L, Chen L. Healthcare practitioner confidence assessing rashes in patients of skin of color with lupus [abstract]. Arthritis Rheumatol 2020;72 Suppl 10.
5. American College of Rheumatology 2017 fellows' board preparation survey. [Internet. Accessed October 14, 2021.] Available from: https://www.rheumatology.org/Portals/0/Files/ACR-Fellows-Board-Preparation-2017-Survey-Results.pdf
6. American College of Rheumatology. Rheumatology image library. [Internet. Accessed October 14, 2021.] Available from: https://www.rheumatology.org/Learning-Center/Rheumatology-Image-Library
7. Firestein GS, Budd RC, Gabriel SE, McInnes IB, O'Dell JR; Koretzky G, ed. Kelley and Firestein's textbook of rheumatology. 11th ed. Elsevier; 2020.
8. Hochberg M, Silman A, Smolen J, Weinblatt M, Weisman M, ed. Rheumatology. 6th ed. Mosby, 2014.
9. West S, Kolfenbach J. Rheumatology secrets. 4th ed. Elsevier, 2019.
10. Gonzalez-Mayda M, Ranganathan P, Ciesielski T, De Fer TM, ed. Washington manual rheumatology subspecialty consult. 3rd ed. Wolters Kluwer Health, 2020. [Internet. Accessed January 02, 2021.] Available from: https://www.vitalsource.com/products/washington-manual-rheumatology-subspecialty-maria-gonzalez-v9781975113414

11. Ebede T, Papier A. Disparities in dermatology educational resources. J Am Acad Dermatol 2006;55:687-90.

12. Fitzpatrick TB. The validity and practicality of sun-reactive skin types I through VI. Arch Dermatol 1988;124:869-71.

13. Centers for Disease Control and Prevention. Systemic lupus erythematosus (SLE). [Internet. Access October 14, 2021.] Available from: https://www.cdc.gov/lupus/facts/detailed.html

14. Goonesekera S, Bansal A, Tadwalkar S, Isherwood A. The prevalence of systemic sclerosis, dermatomyositis/polymyositis, and giant cell arteritis in the United States by race and ethnicity: an analysis using electronic health records [abstract]. Arthritis Rheumatol 2020;72 Suppl 10.

15. Del Puente A, Knowler WC, Pettitt DJ, Bennett PH. High incidence and prevalence of rheumatoid arthritis in Pima Indians. Am J Epidemiol 1989;129:1170-8.

16. Singh JA, Gaffo A. Gout epidemiology and comorbidities. Semin Arthritis Rheum Suppl 2020;50 Suppl:11-6.

17. Morgan ND, Shah AA, Mayes MD, et al. Clinical and serological features of systemic sclerosis in a multicenter African American cohort: analysis of the genome research in African American scleroderma patients clinical database. Medicine 2017;96:e8980.

18. Sreih AG, Mandhadi R, Aldaghlawi F, et al. ANCA-associated vasculitis in Hispanic Americans: an unrecognized severity. Clin Rheumatol 2015;34:943-8.

19. Abrouk M, Lee K, Brodsky M, et al. Ethnicity affects the presenting severity of psoriasis. J Am Acad Dermatol 2017;77:180-2.

20. Hena KM. Sarcoidosis epidemiology: race matters. Front Immunol 2020;11:537382.

21. Tsai J, Ucik L, Baldwin N, Hasslinger C, George P. Race matters? Examining and rethinking race portrayal in preclinical medical education. Acad Med 2016;9:916-20.

22. How Kodak Gold contributed to bias in dermatology. [Internet. Accessed October 14, 2021.] Available from: https://www.medscape.com/viewarticle/938018

23. American College of Rheumatology and Association of Rheumatology Health Professionals. Interdisciplinary care for patients with rheumatic and musculoskeletal diseases by the rheumatology health care team. [Internet. Accessed October 14, 2021.] Available from: https://www.rheumatology.org/Portals/0/Files/Multidisciplinary%20Care%20for%20Patients%20with%20Rheumatic%20and%20Musculoskeletal%20Disease.pdf

24. Strait A, Graf J, Margaretten M, Yazdany J, Goglin S. Race, ethnicity and disparities in rheumatology educational materials. Arthritis Care Res 2021 March 25 (Epub ahead of print).