Peer Reviewed

Dermatologic Findings in Skin of Color for Life-Threatening Pediatric Diseases

Saba Saleem BS, Kristina Burger BS,

"The U.S. Census Bureau projects that by 2050 about half of all dermatologic patients who require treatment will have a skin of color. Skin conditions can present differently in patients with a darker complexion, but primary care physicians and dermatologists are not adequately trained to recognize this (1)."

Introduction

Dermatologic treatment disparities lead to inequitable health outcomes in vulnerable populations (3). Race, age, sex, education level, and health insurance status are all known contributing factors that magnify these disparities (2). The U.S. Census Bureau projects that by 2050 about half of all dermatologic patients who require treatment will have a skin of color. Skin conditions can present differently in patients with a darker complexion, but primary care physicians and dermatologists are not adequately trained to recognize this (1). This is because the current dermatologic literature does not describe pathology presentations in people of color.

"Furthermore, one study found that only 2% of teaching provided at meetings hosted by the American Academy of Dermatology addressed the issue (2). As a result, medical students have reduced accuracy in diagnosing skin conditions if shown an image of the disease on darker skin (6)."

Furthermore, one study found that only 2% of teaching provided at meetings hosted by the American Academy of Dermatology addressed the issue (2). As a result, medical students have reduced accuracy in diagnosing skin conditions if shown an image of the disease on darker skin (6). In this discussion, we will focus on the life-threatening complications of Kawasaki Disease and congenital measles and highlight the potential for their associated skin findings to go unrecognized in pediatric patients of color. The implication of this suggests that minority patients may receive delayed or less aggressive therapy compared to their white counterparts (3). Late or misdiagnosis can lead to a higher morbidity and mortality rate that disproportionately affects this population, which largely comprises Hispanic and African American patients (2). Consequently, patients and their families may mistrust physicians and the healthcare system, worsening their care outcomes (4).

"Kawasaki Disease is an acute, systemic vasculitis that predominantly affects infants and young children between the ages of 6 months to 2 years (7, 10). It is the most common cause of acquired heart disease in American children, with 76% of patients being younger than age five (8, 12)."

Kawasaki Disease

Kawasaki Disease is an acute, systemic vasculitis that predominantly affects infants and young children between the ages of 6 months to 2 years (7, 10). It is the most common cause of acquired heart disease in American children, with 76% of patients being younger than age five (8, 12). The median age of onset is about two years old. Thus, presentation in the neonatal period is considered extremely rare (8, 10). The highest disease incidence is in patients of Japanese descent, followed by black and non-Hispanic white individuals, respectively (8, 9). The diagnostic criteria for Kawasaki Disease include a high fever (greater than 102° F) for five or more days and the presence of at least 4 of the following: bilateral non-purulent conjunctivitis, oral mucosa abnormalities, polymorphous skin rash, peripheral extremity changes, and cervical lymphadenopathy (5). During the acute phase (1-2 weeks of onset), the most characteristic symptoms are a "strawberry red" tongue, cracked lips, and a maculopapular rash. Watchful waiting may be necessary to confirm the diagnosis in patients who do not display all these clinical features at once (8). However, if treatment is considerably delayed or not provided, it can lead to Coronary

Figure 1: Kawasaki Disease symptoms (conjunctivitis, strawberry tongue, rash, palmar erythema) in a white child (13, 14).

Artery Aneurysm (CAA) formation (5). Lack of treatment can also cause sudden death in the subacute phase (2-8 weeks after onset) due to an increased risk of thrombosis. During this period, the patient may appear to be doing better because of the disappearance of fever and other physical symptoms. However, being left untreated results in an elevated platelet count, which creates a hypercoagulable state. Therefore, all children diagnosed with Kawasaki Disease require intravenous immunoglobulin (IVIG) in combination with high-dose aspirin within the first ten days of illness. The most efficacious period is within seven days from the onset of fever. Providing IVIG and aspirin decreases the risk of CAA development to less than 5% and inhibits platelet activation to prevent thrombus formation (8).

"Kawasaki Disease is an acute, systemic vasculitis that predominantly affects infants and young children between the ages of 6 months to 2 years (7, 10). It is the most common cause of acquired heart disease in American children, with 76% of patients being younger than age five (8, 12). "

Kawasaki Disease is an acute, systemic vasculitis that predominantly affects infants and young children between the ages of 6 months to 2 years (7, 10). It is the most common cause of acquired heart disease in American children, with 76% of patients being younger than age five (8, 12). However, it is important to note that even with prompt diagnosis and treatment initiation, the research suggests that there are also racial and ethnic discrepancies in treatment response. One study found that despite no racial difference in time to diagnose and provide treatment, black children with Kawasaki Disease still had worse outcomes than white children. Black patients had more severe inflammation and worse response to IVIG, requiring adjuvant medications such as Etanercept and longer hospitalizations. Providing the standard treatment of IVIG and aspirin within the recommended window did not reduce the risk of coronary artery abnormalities in black children to the same extent as in other demographics (9). This highlights the fact that recognition of physical exam findings of Kawasaki Disease in darker skin tones is only one part of the solution to improving treatment outcomes. There must also be an emphasis on individualizing therapy to the racial and ethnic background of the patient once the diagnosis is made.

"This highlights the fact that recognition of physical exam findings of Kawasaki Disease in darker skin tones is only one part of the solution to improving treatment outcomes. There must also be an emphasis on individualizing therapy to the racial and ethnic background of the patient once the diagnosis is made."

Congenital Measles

Measles (rubeola) is a highly contagious and potentially fatal disease caused by a viral respiratory infection. It is a vaccine-preventable disease and was almost completely eradicated in the United States (19). However, due to declining vaccination rates, there has been a worldwide resurgence between 2017-2019. Fortunately, between 2020-2021, the case numbers dropped again, which was attributed to social distancing with the COVID-19 pandemic (20). Despite this positive news, there is a growing concern that outbreaks will occur again as restrictions ease and the number of unvaccinated children increases (21). Measles

Figure 2: Kawasaki Disease symptoms in a Brazilian child with a medium-to-dark complexion (13, 15).

symptoms begin 7-14 days after exposure and include high fever (above 101° F), maculopapular rash, and at least one of the three C's: cough, coryza, conjunctivitis (19, 20). However, vaccinated individuals can have mild-to-no symptoms. Thus, diagnosis depends on detecting specific IgM antibodies in the serum, fluid, or viral RNA in bodily fluids (20). Acute management for measles includes vitamin A supplementation, a potent immune system enhancer that reduces the risk of blindness and death by 87% for children under two years (22, 23). It is also imperative to monitor and treat secondary bacterial infections with antibiotics. However, since there is no specific antiviral therapy, disease control largely depends on vaccine-driven prevention (21). Recognizing the measles rash and other characteristic symptoms is essential for early diagnosis and treatment (23). The rash begins on the face and spreads to the neck and upper trunk, followed by the lower trunk and extremities. The lesions on the face may become confluent, and the palms and soles are rarely involved. After 3-4 days, the rash changes to a purple-brown color and begins to fade with desquamation (24).

"The measles rash can be misdiagnosed in brown skin tones because it appears hyperpigmented and can resemble petechiae (See Figure 3). It may be missed entirely in black skin as it can be challenging to identify, except for its rough and textured surface (see Figure 4)."

The measles rash can be misdiagnosed in brown skin tones because it appears hyperpigmented and can resemble petechiae (See Figure 3). It may be missed entirely in black skin as it can be challenging to identify, except for its rough and textured surface (see Figure 4). In contrast, the rash is more distinctly visible on lighter skin and appears erythematous (25). The danger of a late diagnosis in the neonatal period is an increased risk of subacute sclerosing panencephalitis (SSPE), a degenerative neurological disease. Measles infection before one year of age can cause SSPE due to the immaturity of the brain (26). Thus, measles is often more deadly in infants and young children (28). Other complications include otitis media, laryngotracheobronchitis, and pneumonia, as the virus destroys epithelium, which favors bacterial superinfections (27). Pregnant women and infants under one year are among the highest-risk groups for these life-threatening complications because of their inability to receive the MMR vaccine (19). This is known as congenital measles, when an infected pregnant woman transmits the virus to her fetus. It is further defined as the presence of the measles rash at birth or within the first ten days of life. Mothers infected with measles late in pregnancy can also transmit the virus postpartum. Newborns with measles display a more severe and rapidly progressive form of SSPE (28). Regarding MMR vaccination before pregnancy, a study on maternal vaccine acceptance found that Black and Hispanic women are less confident in vaccine safety and efficacy and less likely to perceive the risk of acquiring vaccine-preventable diseases (29). These results suggest that congenital measles may be more prevalent in minority populations; however, further research is required.

"With these strategies in place, we can better address treatment disparities and improve health outcomes."

In summary, to correctly identify the measles rash when it presents in a patient of color, healthcare providers should have a high index of suspicion based on the patient history and vaccination status. Prevention is the most critical component of treatment, and it begins with communication. Providing families with evidence-based vaccine information will help them make informed decisions and clear misconceptions (19). Lastly, implementing a nationwide "catch-up vaccination campaign" would help alert parents to the urgency of resuming their child's immunization schedule as the pandemic disrupted it. With these strategies in place, we can better address treatment disparities and improve health outcomes.

Figure 3: Comparison of measles rash in a white and Filipino infant (16, 17).

Figure 4: Nigerian child with measles rash covered by calamine lotion (18).

Conclusion:

Kawasaki Disease and congenital measles can be fatal in pediatric populations if left untreated. Both diseases share a characteristic maculopapular rash; however, this skin finding and other symptoms vary among racial and ethnic groups. Healthcare providers should be aware of potential treatment resistance to Kawasaki Disease in black children and the risk of congenital measles in black and Hispanic newborns with unvaccinated mothers. Physicians can use this information to help guide their diagnosis and management, which can be helpful in vague or unclear clinical presentations. The clinical course of these diseases, particularly in neonates, requires swift recognition and treatment within a certain timeframe; otherwise, there can be deadly consequences.

One way to address this issue is by incorporating health education, open dialogue, and family engagement in discussions about preventing the spread of highly infectious diseases. Another solution is to update dermatologic literature to include more images of skin conditions in patients with a darker complexion. This is especially necessary for diseases with a higher incidence in patients with brown or black skin. For instance, African American children with atopic dermatitis are more likely to develop eczema herpeticum, a medical emergency, than white children. The research shows that due to decreased healthcare utilization in black communities, the disease presentation becomes more advanced than what may be shown in textbooks. Increased disease severity also occurs because darker skin masks the associated erythema, further delaying care (30). An organization that aims to promote awareness of this problem is The Skin of Color Society, which educates providers and the public on dermatologic diseases in the skin of color to help achieve health equity. Better health outcomes will then translate into a stronger trust between the patient and their physician.

"One way to address this issue is by incorporating health education, open dialogue, and family engagement in discussions about preventing the spread of highly infectious diseases. Another solution is to update dermatologic literature to include more images of skin conditions in patients with a darker complexion."

References:

1. *Berg, Sara. "In Dermatology, Health Disparities Can Be Skin Deep." American Medical Association, 19 July 2017, https://www.ama-assn.org/delivering-care/patient-support-advocacy/dermatology-health-disparities-can-be-skin-deep.*
2. *Buster KJ, Stevens EI, Elmets CA. Dermatologic Health Disparities. DERMATOLOGIC CLINICS. 2012;30(1):53-+. doi:10.1016/j.det.2011.08.002*
3. *Kuo A, Silverberg N, Fernandez Faith E, Morgan R, Todd P. A systematic scoping review of racial, ethnic, and socioeconomic health disparities in pediatric dermatology. Pediatr Dermatol. 2021 Nov;38 Suppl 2:6-12. doi: 10.1111/pde.14755.*
4. *Perlman, Katherine L., Elizabeth J. Klein, and Joyce H. Park. "Racial disparities in dermatology training: the impact on black patients." Cutis 106.6 (2020): 300-301.*
5. *Wessels PA, Bingler MA. A comparison of Kawasaki Disease and multisystem inflammatory syndrome in children. Prog Pediatr Cardiol. 2022 Jun;65:101516. doi: 10.1016/j.ppedcard.2022.101516.*
6. *Perlman KL, Williams NM, Egbeto IA, Gao DX, Siddiquee N, Park JH. Skin of color lacks representation in medical student resources: A cross-sectional study. Int J Womens Dermatol. 2021 Jan 8;7(2):195-196. doi: 10.1016/j.ijwd.2020.12.018.*
7. *Marquez J, Gedalia O, Candia L, Ranjit K, Hescock GC, Espinoza LR, Stopa AR, Gedalia A. Kawasaki disease: clinical spectrum of 88 patients in a high-prevalence African-American population. J Natl Med Assoc. 2008 Jan;100(1):28-32. doi: 10.1016/s0027-9684(15)31171-8.*
8. *Gerding R. Kawasaki disease: a review. J Pediatr Health Care. 2011 Nov-Dec;25(6):379-87. doi: 10.1016/j.pedhc.2011.07.007.*
9. *Padilla LA, Collins JL, Idigo AJ, Lau Y, Portman MA, Shrestha S. Kawasaki Disease and Clinical Outcome Disparities Among Black Children. J Pediatr. 2021 Feb;229:54-60.e2. doi: 10.1016/j.jpeds.2020.09.052.*

10. Hangai M, Kubota Y, Kagawa J, Yashiro M, Uehara R, Nakamura Y, Takeuchi M. Neonatal Kawasaki disease: case report and data from nationwide survey in Japan. Eur J Pediatr. 2014 Nov;173(11):1533-6. doi: 10.1007/s00431-014-2347-x.
11. Harahsheh AS, Dahdah N, Newburger JW, Portman MA, Piram M, Tulloh R, McCrindle B.W., de Ferranti SD, Cimaz R, Truong DT, Burns JC. Missed or delayed diagnosis of Kawasaki disease during the 2019 novel coronavirus disease (COVID-19) pandemic. J Pediatr. 2020 Jul;222:261-262. doi: 10.1016/j.jpeds.2020.04.052.
12. Clark DE, Denby KJ, Kaufman LM, Fill MA, Piya B, Krishnaswami S, Fonnesbeck C, Halasa N. Predictors of Intravenous Immunoglobulin Nonresponse and Racial Disparities in Kawasaki Disease. Pediatr Infect Dis J. 2018 Dec;37(12):1227-1234. doi: 10.1097/INF.0000000000002019.
13. Creative Commons Attribution 4.0 International License. (2018, July 26). Conjunctivitis, Rash, Erythema to Palms/Soles [Photographs]. emDocs. http://www.emdocs.net/em-in-5-kawasaki-disease/
14. Creative Commons Attribution ShareAlike 4.0 International License. (2011, January 22). Kawasaki [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Kawasaki.PNG
15. Creative Commons Attribution 4.0 International License. (2021, April 16). Figure 1 [Photograph]. Frontiers in Pediatrics Case Report. https://www.frontiersin.org/articles/10.3389/fped.2021.650697/full
16. Creative Commons CC0 License. (2019, May 19). Young Boy with Measles [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Young_boy_with_measles.jpg
17. Creative Commons CC0 License. (2014, January 27). Measles Child Philippines [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Measles_child_Philippines.jpg
18. Creative Commons CC0 License. (2002, February 19). Measles in African Child [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Measles_in_African_Child.jpg
19. Blakely KK, Suttle R, Wood T, Stallworth K, Baker N. Measles-What's Old Is New Again. Nurs Womens Health. 2020 Feb;24(1):45-51. doi: 10.1016/j.nwh.2019.11.005.
20. Hübschen JM, Gouandjika-Vasilache I, Dina J. Measles. Lancet. 2022 Feb 12;399(10325):678-690. doi: 10.1016/S0140-6736(21)02004-3.
21. World Health Organization. (2021, November 10). Global progress against measles threatened amidst COVID-19 pandemic. https://www.who.int/news/item/10-11-2021-global-progress-against-measles-threatened-amidst-covid-19-pandemic
22. Vitamin A for measles. (n.d.). Cochrane Methods Equity. https://methods.cochrane.org/equity/vitamin-measles
23. Vassantachart JM, Yeo AH, Vassantachart AY, Jacob SE, Golkar L. Art of prevention: The importance of measles recognition and vaccination. Int J Womens Dermatol. 2019 Jul 8;6(2):89-93. doi: 10.1016/j.ijwd.2019.06.031.
24. Warris, A., & Kroon, F. P. (2017). Viral Exanthems. Infectious Diseases, 75–83.e1. https://doi.org/10.1016/b978-0-7020-6285-8.00009-5
25. Measles. Black & Brown Skin. https://www.blackandbrownskin.co.uk/lower-limb/measels
26. Sawaishi Y, Abe T, Yano T, Ishikawa K, Takada G. SSPE following neonatal measles infection. Pediatr Neurol. 1999 Jan;20(1):63-5. doi: 10.1016/s0887-8994(98)00100-3.
27. Misin A, Antonello R.M., Di Bella S, Campisciano G, Zanotta N, Giacobbe DR, Comar M, Luzzati R. Measles: An Overview of a Re-Emerging Disease in Children and Immunocompromised Patients. Microorganisms. 2020 Feb 18;8(2):276. doi: 10.3390/microorganisms8020276.
28. Rasmussen SA, Jamieson DJ. What Obstetric Health Care Providers Need to Know About Measles and Pregnancy. Obstet Gynecol. 2015 Jul;126(1):163-70. doi: 10.1097/AOG.0000000000000903.
29. Dudley MZ, Limaye RJ, Salmon DA, Omer SB, O'Leary ST, Ellingson MK, Spina CI, Brewer SE, Bednarczyk RA, Malik F, Frew PM, Chamberlain AT. Racial/Ethnic Disparities in Maternal Vaccine Knowledge, Attitudes, and Intentions. Public Health Rep. 2021 Nov-Dec;136(6):699-709. doi: 10.1177/0033354920974660.
30. Kaufman BP, Guttman-Yassky E, Alexis AF. Atopic dermatitis in diverse racial and ethnic groups-Variations in epidemiology, genetics, clinical presentation and treatment. Exp Dermatol. 2018 Apr;27(4):340-357. doi: 10.1111/exd.13514.

Financial Disclosures: The authors have no financial disclosures to report.

Conflict of Interest: The authors have no conflict of interest.

NT

Corresponding Author

Saba Saleem BS
DO, MPH Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Johns Hopkins Bloomberg School of Public Health
Pomona, CA
USA
Email: saba.saleem@westernu.edu
Phone: (916) 337-7819

Kristina Burger BS
DO Candidate 2023
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Pomona, CA
USA