PERSPECTIVES

Skin Inclusion: Addressing Deficits in Medical Education to Promote Diversity in Dermatological Diagnosis and Treatment

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Abstract: Dermatological conditions impact many people globally, including those with melanin-rich skin. However, insufficient medical education contributes to delayed diagnoses, misdiagnoses, and inadequate treatment for these conditions. This literature review aims to identify and address gaps in dermatological education for melanin skin. Current research reveals that medical school curricula inadequately cover these conditions, leading to low confidence among students in diagnosing and treating them. This educational deficiency results in healthcare disparities, as melanin skin patients experience inferior outcomes. Misdiagnosis and delayed diagnosis are common due to the lack of training, particularly for conditions like keloids, vitiligo, and lupus erythematosus, which require a specialized understanding of melanin-rich skin. These errors can lead to suboptimal treatment, increased healthcare costs, and negative health outcomes. Additionally, limited representation of melanin skin in clinical studies hampers understanding and treatment options. To address these issues, it is recommended to enhance dermatological education on melanin skin in medical schools, utilize culturally responsive teaching methods, allocate research funds for melanin skin investigations, incorporate telemedicine and artificial intelligence, develop melanin-specific guidelines, and increase diversity in the healthcare workforce. Addressing these educational deficits is crucial for diverse and equitable dermatological care, improved healthcare outcomes, and reduced disparities for individuals with melanin-rich skin.

Keywords: dermatological education, melanin-rich skin, medical school curricula, dermatological guidelines, diversity in healthcare workforce

Introduction

Dermatological conditions are a widespread affliction that impacts a significant proportion of the global population. Individuals with melanin-rich skin, who comprise a substantial subset of those affected, are more prone to encountering a series of negative health outcomes that include diagnostic delays, misdiagnoses, and suboptimal medical intervention. This unfortunate reality is in part attributable to the gaps in medical school curricula which tend to underrepresent dermatological conditions that affect those with higher melanin skin. It is essential to fill these gaps by teaching and emphasizing the importance of understanding the patient-centric diagnostic process for common conditions in darkly pigmented skin and in understanding the variations for the diseases found at higher rates in high-pigment skin, hair, and nails. Consequently, these educational deficiencies engender stark disparities in healthcare provision, with melanin skin patients often receiving inferior healthcare outcomes. In consideration of these pressing concerns, this literature review aims to identify and distill current scholarship on the deficits in medical education that exist regarding the diagnosing and treating of dermatological conditions on high melanin skin. The ultimate objective is to offer a series of actionable recommendations that can help alleviate these educational deficits and narrow the disparities in healthcare provision for melanin skin patients.

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Deficits in Medical Curricula

Recent research studies have indicated that the current curriculum in medical schools is deficient in preparing students to competently diagnose and treat dermatological conditions for those with melanin-rich skin. One such investigation determined that presentation of dermatological conditions across a spectrum of melanin rich phenotypes in skin were addressed in only 13% of medical school curricula, with a meager 4% of these discussions devoted to the diagnosis and treatment of such conditions. Another study reported that medical students exhibited low levels of confidence in diagnosing and treating dermatological conditions on melanin skin and that these concerns persisted even after undergoing dermatology coursework.[1] Such educational shortcomings have grave implications for healthcare equity, particularly for individuals possessing melanin-rich skin, who are prone to experiencing disparities in healthcare outcomes.

Misdiagnosis and Delayed Diagnosis

The dearth of medical school curricula that provide adequate instruction on dermatological conditions on melanin skin has resulted in instances of misdiagnosis and delayed diagnosis, which can have severe repercussions. For instance, individuals with melanin-rich skin are also at a heightened risk of developing keloids, which are elevated scars that emerge following injury or surgery. Keloids can be both disfiguring and debilitating, with the potential to significantly diminish the quality of life of those affected. Unfortunately, because keloids are often inaccurately identified as hypertrophic scars, which are raised scars that are confined within the boundaries of the original wound, individuals with keloids may not receive the appropriate treatment. The delayed diagnosis can lead to inferior healthcare outcomes and increased healthcare expenditure.

Moreover, delayed diagnoses and misdiagnoses of other dermatological conditions in individuals with melanin-rich skin have been reported. As an example, both vitiligo and lupus erythematosus may present differently in individuals with dark skin, leading to incorrect diagnoses and subsequent delays in treatment. Such delays can have negative impacts on the overall physical and psychological health of affected individuals. Inadequate training on diagnosing and treating these conditions in medical school curricula exacerbates the problem, highlighting the need for increased attention to dermatological conditions in individuals with melanin-rich skin in medical education.

Misdiagnosis and delayed diagnosis of skin conditions on melanin-rich skin can also lead to the excessive use of topical steroids, which are commonly prescribed for conditions such as eczema and psoriasis. Prolonged use of topical steroids can result in skin thinning, stretch marks, and an increased risk of infections, especially in individuals with dark skin. Additionally, the prolonged use of topical steroids can also cause hypopigmentation impacting appearance to a greater degree in those with more melanin at a baseline. Furthermore, topical steroids may not effectively treat certain dermatological conditions that are more prevalent in individuals with melanin-rich skin, such as post-inflammatory hyperpigmentation (PIH) and pseudo folliculitis barbae (PFB).

The lack of appropriate diagnosis and treatment of PIH, characterized by dark patches on the skin, can cause psychological distress and reduce the quality of life for those affected. Similarly, misdiagnosis and inadequate treatment of PFB, a type of folliculitis common in individuals with curly hair, can lead to scarring, permanent hair loss, and bacterial infections.

A common cause of skin cancer in Black patients is acral lentiginous melanoma (ALM) which manifests as black or dark patches on the palms, soles of feet, or beneath nails. Unlike other types of skin cancer, ALM is not linked to ultraviolet (UV) exposure. As noted by Dr. Nelson in his article "How Dermatology is failing melanoma patients with skin of color", ALM disproportionately affects a higher percentage of melanoma cases in darker-skinned individuals, with around 30–70% of all melanoma cases in darker-skinned people being ALM. Furthermore, a study conducted by Krueger in 2022, showed that physicians were "more than twice likely to recommend a biopsy for benign neoplasms… and significantly less likely to recommend a biopsy for malignant neoplasm for patients with skin of color". These together suggest that most physicians would be unable to correctly diagnose ALM or have patients undergo unnecessary biopsies due to lack of medical confidence of melanin-specific dermatological conditions.

Even after correctly ordering a biopsy for patients, physicians commonly missed diagnosing patients with skin of color with the correct etiology.[2] This discrepancy in treatment and recognition can lead to delayed diagnosis and

ultimately lower survival rates once the diagnosis has been reached. According to a 2019 study by Culp and Lunsford on Melanomas among Non-Hispanic Black Americans, the five-year survival rate in the US for Black patients between 2011 and 2015 was 66% compared to the 90% survival rate of non-Hispanic White patients.[3]

In addition to negative health outcomes for patients, the inadequate training of healthcare providers on dermatological conditions on melanin skin perpetuates racial and ethnic disparities in healthcare. Patients with melanin-rich skin may face additional barriers to accessing healthcare, such as language barriers, financial barriers, and distrust of healthcare providers. Improving the education and training of healthcare providers on dermatological conditions on melanin skin is a critical step in addressing these disparities and improving health equity.

Lack of Dark Skin Studies

The paucity of investigations on dermatological conditions on melanin skin has played a role in creating the deficiencies that exist in medical school curricula. Most clinical studies on skin cancer have concentrated on cohorts with fair skin, thereby raising questions about the generalizability of the findings to individuals possessing melanin-rich skin.[4] The scarcity of research has culminated in a dearth of viable treatment options and inferior healthcare outcomes for individuals with melanin-rich skin.

Insufficient research on dermatological conditions on melanin-rich skin has resulted in healthcare providers' inadequate awareness and understanding, which may lead to delayed diagnoses and misdiagnoses. For instance, acanthosis nigricans, characterized by darkened and thickened skin, is prevalent in individuals with obesity and insulin resistance, conditions that are more common in individuals with darker skin tones.[5] However, healthcare providers may overlook or misdiagnose it as a benign cosmetic concern due to the lack of knowledge about its underlying medical conditions. Delayed diagnosis of acanthosis nigricans can result in missed opportunities for early intervention and treatment of underlying medical conditions, such as diabetes or polycystic ovary syndrome.

Furthermore, sarcoidosis, an inflammatory condition that can affect multiple organs, presents differently in individuals with melanin-rich skin and is often misdiagnosed as other conditions, such as tuberculosis or fungal infections.[6] Delayed diagnosis of sarcoidosis can lead to organ damage and functional impairment, as well as increased healthcare costs.

Skin cancer is often misdiagnosed or diagnosed at a later stage in individuals with melanin-rich skin, leading to poorer outcomes and higher mortality rates. This is partly due to the misconception that individuals with darker skin tones are not susceptible to skin cancer, as well as the difficulty in identifying suspicious lesions on dark skin.[7] The inadequate representation of melanin-rich skin in clinical studies has contributed to the insufficient understanding of the disease in individuals with melanin-rich skin, resulting in inferior healthcare outcomes.

The lack of diversity in clinical studies and medical education perpetuates healthcare disparities. Inadequate training on dermatological conditions on melanin skin may contribute to the distrust of healthcare providers among individuals with darker skin tones, further perpetuating healthcare disparities. Addressing knowledge gaps and promoting diversity in clinical research and medical education is critical to improving healthcare outcomes and reducing healthcare disparities in individuals with melanin-rich skin.

The underrepresentation of minority groups in science, technology, engineering, and math (STEM) fields is a multifaceted issue, but there are ways to address this by fostering a more equitable environment. One crucial approach is mentorship, which has been shown to significantly benefit students from underrepresented backgrounds. Effective mentorship should encompass more than just academic and career guidance; it should also provide emotional and social support to help students overcome obstacles and succeed in their education and careers.

Another critical step is to prioritize research and excellence in curricular development by including faculty of color. This can be achieved by actively seeking out and hiring diverse faculty members and providing them with the necessary support and resources. Through diversifying the faculty, institutions can better serve the needs of their diverse student body and offer inclusive perspectives and experiences in STEM fields.

In addition, collegial support is essential for fostering an environment that promotes the success of underrepresented groups. Creating spaces where individuals from different backgrounds can come together, share their experiences, and

offer support is a valuable step toward creating a more inclusive environment. Institutions can also establish affinity groups and support networks to help underrepresented groups connect and build a sense of community.

It is time for institutions and individuals to create action steps toward addressing the lack of diversity in STEM fields. Implementing these measures can help create a more equitable and inclusive environment, promoting greater success and opportunities for underrepresented groups. The time for change is now.

Recommendations

To mitigate the inadequacies of medical curricula in detecting and managing dermatological conditions on melanin skin, multiple proposals can be posited. Primarily, medical institutions must augment the time devoted to dermatological conditions on melanin skin in their course offerings. Secondly, medical schools should employ culturally responsive pedagogical approaches that encompass experiential training, such as the utilization of simulation models or supervised clinical engagements with patients possessing melanin-rich skin. Lastly, there ought to be an increment in research funding to support investigations on dermatological conditions on melanin skin, which would result in a better comprehension of these conditions and the creation of enhanced treatment options.

In addition to the previously mentioned recommendations, there are various other strategies that can enhance healthcare outcomes for individuals with melanin-rich skin. One of these approaches is telemedicine with trained on-site investigators, which can be utilized to expand access to dermatological care for individuals in underserved communities. Telemedicine can provide easy, cost-effective, and timely access to dermatological consultations and follow-up care for patients with melanin-rich skin who reside in regions with limited access to dermatologists.[8]

Another effective method is to integrate technology, such as artificial intelligence (AI), into the diagnosis and treatment of dermatological conditions on melanin skin. AI can boost diagnostic accuracy and reduce healthcare disparities in skin cancer diagnosis on melanin skin.[9] AI algorithms can be trained to recognize and distinguish between different dermatological conditions on melanin skin, and dermatologists can utilize these algorithms as a diagnostic aid to enhance their precision in diagnosing and treating these conditions.

Moreover, the development of dermatological guidelines that are specific to melanin skin can enhance healthcare outcomes. These guidelines can offer dermatologists and other healthcare providers standardized, evidence-based recommendations for the diagnosis, management, and treatment of dermatological conditions on melanin skin. The American Academy of Dermatology has recently published guidelines for the treatment of acne vulgaris in skin of color, which can serve as a model for future dermatological guidelines that are specific to melanin skin.[10]

Lastly, increasing diversity and representation in the healthcare workforce can also contribute to reducing healthcare disparities in individuals with melanin-rich skin. A diverse healthcare workforce that includes individuals from various racial and ethnic backgrounds can provide culturally competent care, which can improve patient satisfaction, trust, and health outcomes.[11] Therefore, efforts to enhance diversity in medical school admissions, faculty hiring, and training programs can contribute to reducing healthcare disparities in individuals with melanin-rich skin.

Conclusion

In conclusion, the lack of diversity in STEM fields is a complex and pressing issue that requires immediate action. To address this problem, it is crucial for institutions and individuals to prioritize mentorship for underrepresented students, diversify faculty and prioritize research and excellence in curricular development that includes faculty of color, and create an environment that fosters community and support.

It is important to recognize that the lack of diversity in STEM fields not only perpetuates inequality but also impedes progress and innovation. Therefore, we must take bold steps toward equity and inclusivity. The time for talking about this issue is over; we must take concrete actions to address it.

We need to demand change, hold institutions accountable, and work towards a future where everyone, regardless of their background, has an equal opportunity to pursue their passion and contribute to the advancement of STEM fields. It is only through a collective effort that we can make meaningful progress toward a more diverse and inclusive STEM community.

Data Sharing Statement

The datasets analyzed during the study are available from the selected studies included in the literature review, which can be accessed through the respective publications.

Ethical Approval

This study did not involve any human or animal subjects, and therefore ethical approval was not applicable.

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Disclosure

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