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# Enhancing Awareness and Education of Acral Lentiginous Melanoma in At-Risk Communities

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## Abstract

Acral Lentiginous Melanoma (ALM) is a distinct and aggressive melanoma subtype, predominantly affecting people of color. Despite its relative rarity, ALM is associated with higher recurrence rates and poorer outcomes compared to other melanoma variants. ALM typically manifests on the hands, feet, and subungual regions, often presenting unique diagnostic challenges. Unlike other melanoma subtypes, ALM is not strongly linked to sun exposure, yet it disproportionately impacts ethnic minorities, particularly Africans, Asians, and Latin Americans. This study aims to enhance the understanding of ALM by examining its clinical presentation, diagnosis, treatment strategies, and the significant racial disparities in incidence and outcomes. We also explore the current state of educational efforts and propose strategies for improving awareness and early detection in at-risk communities. A comprehensive review of the literature was conducted, focusing on ALM's epidemiology, diagnostic challenges, treatment modalities, and the impact of socioeconomic and cultural factors on patient outcomes. We analyzed current educational initiatives and identified gaps in public health campaigns that contribute to delayed diagnoses and suboptimal treatment outcomes. ALM is often diagnosed at later stages in non-white populations, largely due to socioeconomic disparities and cultural barriers that impede early detection. Misconceptions regarding the susceptibility of darker skin to melanoma, combined with the underrepresentation of skin of color in educational materials, further exacerbate these disparities. While treatment typically involves surgical excision, the variability in therapeutic approaches highlights the need for ongoing research and data collection to optimize outcomes. Enhancing patient education and increasing the identification of ALM cases will foster better clinical practice and enable more robust data comparisons across diverse populations. The findings underscore the critical need for targeted, culturally sensitive educational programs to address the unique challenges posed by ALM. By improving awareness and understanding within both healthcare providers and the general public, we can promote earlier detection and better management of ALM, particularly in underrepresented communities. Continued interdisciplinary collaboration and research are essential to reduce the existing disparities in ALM care and improve outcomes for all affected populations.

**Keywords:** acral lentiginous melanoma; melanoma; minority; skin of color; cutaneous skin cancer

## Introduction

The deadliest cutaneous skin cancer is melanoma, which refers to a malignant proliferation of melanocytes. Melanoma can be categorized into many variants, which helps to provide insight into risk factors, metastatic potential, anatomic locations, morphology, and histopathology of the skin cancer. While there are several variants of melanoma, Acral Lentiginous Melanoma (ALM) stands out due to its unique characteristics and its significant impact on people of color [1]. ALM typically manifests on the hands and feet, particularly near or under the nails, and, unlike other melanoma variants, is not strongly associated with chronic sun exposure [1,2]. Acral lentiginous melanoma represents the predominant subtype occurring on extremities, mainly affecting the hairless skin of the hands, feet, and nailbeds [3]. Although ALM is relatively rare, comprising only 2%-3% of all melanomas, ALM has higher recurrence rates and worse outcomes compared to other similarly staged melanoma subtypes [3-6]. Current educational efforts regarding melanoma largely focus on the more common variants, such as superficial spreading melanoma, emphasizing risk factors like chronic sun exposure and warning signs such as the "ABCDE" criteria [7]. Educational efforts are increasing and awareness is slowly spreading with regards to melanoma; however, there is a critical need to raise awareness of ALM's distinctive features, its prevalence among people of color, and the unique challenges it poses in terms of diagnosis and treatment [7,8].

Incidence rates for ALM are similar across racial and ethnic groups, which deviates from the vast majority of common melanoma subtypes, which typically affect

 

those with lighter fitzpatrick skin types disproportionately [8]. As such, ALM is the most common type of melanoma in ethnic minorities, including Africans, Asians, and Latin Americans [4,5]. ALM is frequently diagnosed at late stages and has higher incidences in non-white populations in relation to other forms of cutaneous malignant melanoma [4-6]. Given the disproportionate impact of ALM on these groups and the frequent late-stage diagnosis, it is essential to address the cultural and systemic barriers that hinder early detection and access to care [9]. This paper seeks to enhance understanding of ALM by examining its diagnosis and treatment, exploring the racial disparities in its incidence and outcomes, and evaluating educational efforts aimed at improving awareness and early detection in at-risk communities. Through this approach, we aim to foster more effective, culturally sensitive strategies for the awareness and prevention of ALM, particularly in underrepresented communities.

## Overview and Diagnosis of Acral Lentiginous Melanoma

Acral Lentiginous Melanoma is a subtype of melanoma that is distinct in both its location and presentation. Unlike more common forms of melanoma, which are often associated with sun-exposed areas, ALM typically appears on the hands, feet, and subungual regions-areas that are generally devoid of hair, such as the fingertips and nail beds [10]. ALM is most commonly found on the sole of the foot, where it presents as an atypical pigmented macule. This macule can extend both horizontally and vertically, forming plaques or nodules as the disease progresses [10]. The involvement of the subungual region is particularly concerning, as ALM in this area often manifests as a longitudinal, uneven-pigmented band with an irregular border. This progression can lead to severe complications, such as splitting or destruction of the nail plate, especially if the diagnosis is delayed [11].

Diagnosing ALM poses unique challenges due to its variable appearance and its potential to mimic benign lesions like melanocytic nevi [12,13]. The commonly used "ABCDE" method-Asymmetry, Border irregularity, Color variation, Diameter greater than 6mm, and Evolution-although effective for many melanomas, may not always be applicable to ALM [7]. Instead, the "CUBED" approach is often more appropriate [14]. This acronym stands for Color variations, Uncertain lesions, Bleeding, Enlargement, and Delay in healing, which are more characteristic of ALM and help in its identification [14]. Dermoscopy plays a crucial role in the diagnosis of ALM, revealing the "parallel ridge pattern" (PRP), a hallmark sign with a high degree of sensitivity and specificity [15]. This pattern is particularly useful in distinguishing ALM from other conditions, such as melanocytic nevi, which may have similar clinical presentations but lack the PRP sign [15]. Histopathologically, ALM is characterized by several features that differentiate it from other melanoma subtypes. These include acanthosis, a spindle-cell makeup in the dermal components, poor circumscription, and a lentiginous growth pattern into the upper epidermis.[16] These histological characteristics are often accompanied by inflammatory changes in the papillary dermis. Given the complexity of these features, a holistic approach that combines clinical assessment, dermoscopy, and histopathological examination is essential for an accurate diagnosis [3,16].

The treatment of ALM primarily involves surgical excision, which is often more extensive than in other types of melanomas due to the tendency for under-staging [17]. This under-staging necessitates wider margins during excision to ensure complete removal of the malignant growth [17]. In cases where ALM affects the subungual region, surgical excision can involve amputation of the affected digit, although this approach remains controversial due to its significant impact on the patient's quality of life [18]. In more advanced stages, or when the disease is unresectable, systemic therapies become the primary treatment modality [18]. Moreover, immune checkpoint inhibitors, such as pembrolizumab and nivolumab, have shown significant promise in improving recurrence-free survival in stages IIb-IV ALM [19,20]. These therapies are particularly effective when used in combination because studies have demonstrated higher response rates with combination therapy in comparison to monotherapy [21]. Although various treatment modalities are currently being employed and explored, therapeutic approaches often need to be individualized based on each patient's specific presentation and disease progression [18]. As we continue to refine our understanding of ALM through ongoing research and the accumulation of clinical data, treatment outcomes are expected to improve. Enhancing patient education and increasing the identification and treatment of ALM cases will not only better inform clinical practice but also enable

 

more comprehensive data comparison, ultimately guiding the optimization of therapeutic strategies.

## Racial Disparities and Risk Factors in Acral Lentiginous Melanoma

Acral Lentiginous Melanoma presents a unique challenge in the field of dermatology due to the racial disparities observed in its incidence and outcomes [4,9]. Unlike other forms of melanoma, which predominantly affect individuals with lighter skin tones and are strongly associated with ultraviolet (UV) radiation exposure, ALM does not exhibit significant variation in incidence across different racial and ethnic groups [11]. However, this does not imply that the burden of ALM is evenly distributed. In fact, ALM is often diagnosed at more advanced stages in non-white populations, leading to poorer outcomes when compared to their Caucasian counterparts [11,22]. This discrepancy can be attributed to a complex interplay of socioeconomic factors, limited access to healthcare, and cultural barriers that impede early detection and timely treatment [23].

Socioeconomic factors play a critical role in the disparities seen in ALM outcomes. Individuals from lower socioeconomic backgrounds or even those in medically underserved communities are less likely to have access to regular healthcare, including routine skin checks that could lead to early detection of melanoma. Additionally, healthcare disparities often lead to minority populations, especially those in underserved areas, receiving delayed or less aggressive treatment, contributing to the worse prognosis observed in these groups [24]. Cultural factors also contribute to these disparities in that many communities, there is a pervasive belief that individuals with darker skin are at a lower risk for skin cancer, leading to a lower index of suspicion among both patients and healthcare providers [25]. This myth, deeply rooted in historical narratives, has led to significant delays in diagnosis, as symptoms of ALM are often attributed to less severe conditions [25,26]. The underrepresentation of darker skin tones in educational materials and public health campaigns further exacerbates these issues [8,26]. Studies have shown that most skin cancer awareness campaigns predominantly feature images and information relevant to lighter skin types, which can create a false sense of security among individuals with darker skin [26]. This lack of representation not only impacts patient awareness but also influences the diagnostic acumen of healthcare providers, who may be less familiar with the presentation of melanoma in darker skin tones.

Misdiagnosis is another critical issue contributing to the disparities in ALM outcomes [27,28]. For instance, ALM lesions on the foot are sometimes mistaken for diabetic foot ulcers, especially in patients with a history of diabetes, a condition that disproportionately affects minority populations [28]. Moreover, nail conditions, such as subungual ALM, present great difficulty in terms of diagnosis and are often confused with psoriatic changes, nevi, or onychomycosis [27]. These diagnostic challenges not only support the need for careful diagnostic measures in subungual conditions, as pertaining to ALM, but also improved educational programs that address common misconceptions related to melanoma and ALM, particularly in distinguishing it from common nail dystrophy or onychomycosis [27]. This education is imperative because misdiagnoses can lead to inappropriate treatment and further delays in addressing the underlying malignancy [27,28]. As a result, ALM is often diagnosed at a more advanced stage in non-white patients, where the prognosis is significantly poorer [26,28].

## Educational Efforts and Future Directions

The current state of awareness and education surrounding Acral Lentiginous Melanoma is insufficient, particularly within communities of color where the disease is most prevalent [26]. Despite the relatively consistent incidence of ALM across different racial and ethnic groups, awareness levels remain alarmingly low, particularly among non-white populations [29]. This gap in awareness is not only due to the rarity of the disease but also to the shortcomings of existing educational initiatives, which have historically focused on more common melanoma subtypes that predominantly affect lighter-skinned individuals [29].

A significant factor contributing to the lack of awareness is the ineffective nature of many current awareness campaigns [26]. Studies have shown that public health initiatives aimed at educating the public about melanoma often fail to address the unique characteristics of ALM, particularly its prevalence among people of color [29]. Moreover, the representation of skin cancer in media and educational materials is skewed towards lighter skin tones, with a study finding that the vast majority of images used in skin cancer prevention campaigns depicted lighter skin types [29,30]. In fact, only a small percentage of posts on social media from

 

organizations promoting skin cancer prevention specifically addressed skin cancer in people of color [30]. This lack of representation contributes to a broader public misconception that melanoma, and particularly ALM, is a disease that primarily affects Caucasian individuals [26,30].

To address these educational shortcomings, it is imperative to develop more inclusive and representative educational materials. These materials should accurately reflect the diversity of skin types and be tailored to meet the needs of various communities. This could involve translating educational content into multiple languages, such as Spanish, to reach a broader audience [31]. Additionally, the use of video-based content could be particularly effective in overcoming literacy barriers, making information more accessible to a wider range of individuals, especially in underserved communities [29].

Looking forward, the future of ALM education and awareness lies in the integration of culturally sensitive approaches to public health [31]. This includes training healthcare providers to recognize the signs of ALM in patients with darker skin tones and ensuring that educational efforts are designed with the needs of diverse populations in mind. By enhancing patient education, improving the inclusivity of public health campaigns, and fostering greater awareness among healthcare providers, we can hope to achieve earlier diagnoses and better outcomes for ALM in at-risk communities [31].

Acral Lentiginous Melanoma (ALM) remains a significant and challenging subtype of melanoma, particularly due to its distinct presentation and its prevalence among people of color [3,4]. Despite comprising a relatively small percentage of all melanoma cases, ALM's aggressive nature and the higher recurrence rates associated with it necessitate a deep understanding of its pathophysiology, diagnosis, and treatment options [5]. The current body of research indicates that ALM poses unique diagnostic challenges, often leading to delayed identification and worse prognoses, especially in people of color [7].

The racial disparities evident in ALM outcomes highlight the urgent need for targeted educational efforts [9]. Misconceptions about skin cancer risks in people with darker skin, coupled with the underrepresentation of ALM in public health campaigns, contribute to delayed diagnoses and suboptimal treatment outcomes [20,21]. Additionally, socioeconomic factors and limited access to healthcare exacerbate these disparities, making early detection and effective treatment more challenging [8]. Addressing these disparities requires a multifaceted approach, including the development of more inclusive educational materials and the implementation of culturally sensitive outreach programs [29]. By improving awareness and understanding of ALM within both healthcare providers and the general public, we can work towards earlier detection and better management of this melanoma subtype [9,29].

Moreover, the variability in treatment approaches underscores the importance of continued research and data collection [10,18]. As more cases of ALM are identified and treated, our ability to refine therapeutic strategies will improve, ultimately leading to better patient outcomes [11,18]. The expansion of patient education initiatives is crucial, as it not only enhances early detection but also fosters a more informed patient population that is better equipped to engage in their own care [30]. This, in turn, will allow for more robust comparisons of treatment efficacy across diverse populations, providing the data necessary to optimize ALM management [12,19].

In conclusion, while significant strides have been made in understanding and treating Acral Lentiginous Melanoma, there is still much work to be done [19,22]. The intersection of research, education, and clinical practice will be pivotal in improving the prognosis for those affected by this challenging melanoma subtype [30]. As we continue to enhance patient education, refine diagnostic techniques, and develop more effective treatment modalities, we can look forward to better outcomes and a reduction in the disparities that currently exist in ALM care [28]. Ongoing collaboration between researchers, clinicians, and public health professionals will be essential in achieving these goals, ultimately leading to a more equitable approach to melanoma treatment and prevention [18,30].

## Discussion

Socioeconomic status plays a significant role in the prognosis and incidence of ALM. Hispanic White and Black patients exhibit a notably higher risk of death compared to non-Hispanic Whites, as demonstrated by Yan et al., highlighting increased mortality in ethnic minority groups [32]. This disparity is likely due to the lack of access to insurance and various treatment modalities, such as immunotherapy, chemotherapy, and radiotherapy, which can be financially burdensome [32].

 

Advancements in precision medicine are opening new avenues for ALM treatment, with ongoing clinical trials focusing on targeted therapies that address the underlying cellular pathogenic mechanisms, including the MAPK and PI3K/AKT/PTEN pathways [32]. However, the high degree of tumor heterogeneity in ALM presents challenges in the implementation of these therapies [33-35]. Despite these challenges, there is optimism that continued research will yield more reliable therapeutic options. Nevertheless, ensuring equitable access to these novel treatments for ethnic minorities remains a pressing concern [33-35].

The integration of public health and epidemiological data is crucial for improving diagnostic and management strategies in melanoma care. The extraction of critical statistical data—such as prevalence, incidence, risk factors, and prognostic factors—enables clinicians to provide more effective guidance, such as advising patients on the use of sunscreen to mitigate UV exposure [36]. Collaboration between clinicians and public health experts is essential in raising awareness, ultimately contributing to improved outcomes in melanoma management [36].

## Conclusion

Addressing the disparities in ALM requires a multifaceted approach that incorporates socioeconomic considerations, advancements in precision medicine, and strategic public health initiatives. By fostering interdisciplinary collaboration and ensuring equitable access to advanced therapies, there is potential to reduce disparities and improve outcomes for populations disproportionately affected by ALM.

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