



Congenital Dermal Melanocytosis in Skin of Color and Its Misdiagnosis as Child Abuse

Calista Persson^{1*}, Kareena Chawla², Isma Faisal³, Emily Garelick⁴, Natalie Govea⁵, Faith Jean⁶, and Riya Batra⁷

¹Nova Southeastern University Kiran Patel College of Osteopathic Medicine, USA

²Nova Southeastern University Kiran Patel College of Allopathic Medicine, USA

³University of Central Florida, USA

⁴Philadelphia College of Osteopathic Medicine, USA

⁵Burrell College of Osteopathic Medicine, USA

⁶Meharry Medical College, School of Medicine, USA

⁷Orlando College of Osteopathic Medicine, USA

Abstract

Background/Objectives: Congenital Dermal Melanocytosis (CDM), historically called Mongolian spots, are benign bluish-gray or green pigmented birthmarks most often located on the lumbosacral region of infants with skin of color. Although harmless and usually fading by school age, their resemblance to bruises can lead to misdiagnosis of child abuse, with serious clinical and forensic consequences. This review examines the epidemiology, clinical features, and diagnostic challenges of CDM, and explores cases and factors contributing to its misidentification as inflicted injury.

Methods: A narrative literature review (2015-2025) was performed, including case reports, series, observational studies, and clinical trials retrieved from pediatric and dermatology databases. Foundational older sources were included for historical context.

Results: CDM prevalence is 50–90% in Asian, African, and Hispanic infants, but <10% in Caucasian infants. Lesions are flat, blue-gray or blue-green, with indistinct borders and most often lumbosacral. Misdiagnoses occur in atypical sites (e.g., limbs) or without prior documentation. Provider inexperience, limited skin of color training, and implicit bias contribute to errors.

Conclusions: CDM can be distinguished from bruising by congenital onset, stable appearance, and absence of tenderness or color change. Dermoscopy, short-interval follow-up, and documentation at birth aid recognition. Interdisciplinary collaboration between pediatrics, dermatology, and child protection is essential. Improving awareness and education will prevent false abuse allegations while ensuring true abuse is not missed.

Keywords: Congenital dermal melanocytosis; Mongolian spots; Skin of color; Child abuse; Bruise mimics; Pediatric dermatology

Abbreviations: CDM: Congenital Dermal Melanocytosis; CHAMP: Child Abuse Medical Provider Program.

INTRODUCTION

Congenital Dermal Melanocytosis (CDM), also referred to as Mongolian spots or slate gray nevus, is characterized by bluish-gray macules on the skin of infants. CDM lesions arise from the “entrapment” of melanocytes in the dermis instead of their regular migration to the epidermis during embryogenesis [1,2]. Lesions present as flat, bluish-gray to blue-black or deep brown macules with irregular, wavy borders at birth or shortly thereafter [3]. Dermal melanocytosis is most commonly found on the lumbosacral region and buttocks in most patients; however, involvement of the shoulders, flanks, or extremities has also been described [4]. In general, CDM is a harmless condition that typically resolves on its own over time, usually by early childhood or puberty [3].

CDM is most prevalent in darker skin phototypes, with extensive epidemiologic studies demonstrating much higher incidence in Asians, Africans, Native Americans, and Hispanics compared to Caucasians. In some groups of East Asian or African ancestry, the prevalence at birth can be as high as 80–90%, while the incidence in Caucasian infants is on average only 5–10% [5]. For example, a study by Kettner et al., found that CDM lesions were present in 86% of Chinese, 84% of Indian, 77% of Mexican, and 63% of Saudi Arabian newborns but less than 10% of light-skinned European controls [5]. This significant ethnic disparity is why CDM has been popularly referred to as a “skin of color” lesion. As a result, clinicians less familiar with the skin of color may not recognize these birthmarks at birth. In very light-skinned infants, bluish patches may lead to more suspicion of bruising instead of a benign developmental finding [5].

Rare case reports have associated extensive or atypical CDM with inherited metabolic disorders such as Hurler syndrome, Niemann-Pick disease, and other mucopolysaccharidoses [5]. While these associations are rare, unusually widespread or persistent lesions may warrant additional workup [3].

The primary medicolegal relevance of CDM stems from the fact that Mongolian spots may be confused for bruises (ecchymoses). Mongolian spots have a well-documented history of being mistaken for signs of inflicted injury, which has led to numerous unnecessary and traumatic child abuse investigations [6]. Both bruising and CDM present as blue-gray patches on the skin, most commonly on the buttocks or back. However, bruises will often change color as they heal, may be tender, and resolve over a matter of days to weeks. In contrast, CDM remains stable,

Submitted: 16 September 2025 | **Accepted:** 20 October 2025 | **Published:** 22 October 2025

***Corresponding author:** Calista Persson, Nova Southeastern University Kiran Patel College of Osteopathic Medicine, USA, Tel: (904) 305-7943

Copyright: © 2025 Persson C. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Syed IM, Chawla K, Faisal I, Garelick E, Govea N et al, (2025) Congenital Dermal Melanocytosis in Skin of Color and Its Misdiagnosis as Child Abuse. SM J Pediatr 6(1): 8.



asymptomatic, and will only fade gradually. Failure to differentiate the two can lead to family separation, criminal prosecution, and other long-term consequences.

Diagnostic issues are made more difficult by racial disparities and gaps in dermatology education. CDM has historically been underrepresented in dermatology teaching materials, with depictions of darkly pigmented skin being especially limited [7]. Moreover, families from minority backgrounds may be subject to heightened scrutiny due to systemic biases. Black and Indigenous children, in particular, are overrepresented among child abuse reports and foster care placements [8]. Implicit bias among providers may lead to overinterpretation of normal lesions as suspicious findings [9]. In fact, Palusci and Botash make note of this, stating that pediatric professionals should be aware of their biases, as minority race has been shown to predict child abuse reporting even after adjustment for other confounding factors [9].

In this narrative review, we aim to discuss the epidemiology, presentation, and differential diagnosis of CDM, with a focus on misidentification as bruising and the ramifications for families. We also mention some cultural practices and dermatologic findings that may mimic trauma. Recognizing CDM for what it is a benign birthmark remains the first and most important step in preventing false allegations, while ensuring that true cases of abuse are not overlooked. Figure 1 illustrates the appearance of CDM on the buttocks, demonstrating its similarity to bruising and underscoring the diagnostic challenge.

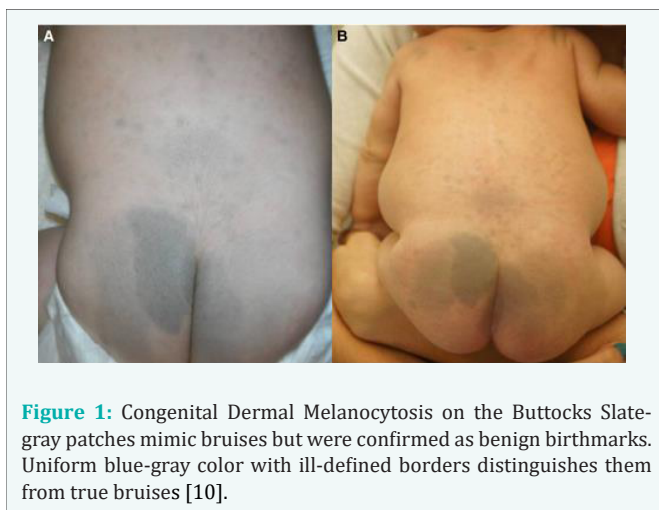


Figure 1: Congenital Dermal Melanocytosis on the Buttocks Slate-gray patches mimic bruises but were confirmed as benign birthmarks. Uniform blue-gray color with ill-defined borders distinguishes them from true bruises [10].

METHODS

To identify relevant literature, searches were conducted in PubMed, Medline, and Scopus for articles published between January 2015 and March 2025. The search terms included “Mongolian spots,” “congenital dermal melanocytosis,” “dermal melanocytosis,” “child abuse,” “bruises,” “skin of color,” and “abuse mimics.” Filters were used to limit results to English-language studies and pediatric populations.

Articles were included if they were original research (case reports, case series, cohort studies, cross-sectional studies, and clinical trials) that discussed CDM or its misdiagnosis. Review articles were included to provide a broad analysis of the topic. Studies focused on racial disparities in reporting abuse were included. Articles about recognition of specific skin findings in patients with varying skin tones were also included. Articles were excluded if they were not pediatric in focus, were not in English with enough data presented in English to review, or did not pertain to dermal melanocytosis. Reports of cultural practices that caused abuse-like skin findings were included.

A hand-search of the bibliographies of relevant articles was conducted

to identify any additional articles from the specified time period. Seminal articles and those describing historical cases of CDM and child abuse were included in the Introduction. The data were extracted and tabulated to highlight the prevalence by ethnicity, clinical features of CDM, reported misdiagnoses, diagnostic methods to differentiate CDM from bruising, and a discussion of cultural and social issues that lead to errors. Results were analyzed narratively, and similar reports were aggregated, with unique or dissenting reports highlighted. Tables of differential diagnosis of CDM vs. other conditions, as well as case examples of CDM misattributed as abuse, are included. Representative images of CDM are also included to illustrate their similarity to bruising.

RESULTS

The clinical challenge of congenital dermal melanocytosis lies not only in recognizing its characteristic presentation but also in distinguishing it from other cutaneous findings that may mimic signs of child abuse. The most frequent diagnostic confusion occurs with bruising, given the similar bluish coloration and lumbosacral distribution seen in infants. However, unlike bruises, CDM lesions are present at or shortly after birth, remain non-tender, and persist for months to years before gradually fading. Additional differentials include nevus of Ota, nevus of Ito, and blue nevus, all of which share the feature of dermal melanocytic pigmentation but differ in location, onset, and clinical course. Table 1 provides a comparative summary of these entities, emphasizing the distinctions in onset, distribution, color, borders, tenderness, and natural history that are critical for accurate diagnosis and for avoiding misinterpretation as inflicted injury.

Epidemiology and Clinical Characteristics of CDM in Skin of Color

Congenital dermal melanocytosis is among the most prevalent dermatologic findings in newborns of color. Reported prevalence ranges from 50-90%, reflecting genetic influences on pigmentation. In Asian and African infants, CDM is reported in 50-90% [11]; a recent Indian study found >80%, with surveys in China and Japan also exceeding 80% [5-17]. Latino and Native American infants show similarly high rates, with ~77% of Mexican newborns affected [5]. By contrast, Caucasian infants are rarely affected one Finnish study reported only 1 case in 4,340 infants (0.02%), and U.S. studies cite 5-10% [5]. African-American and Hispanic infants in the U.S. demonstrate intermediate prevalence (20-30%), likely reflecting admixture [5]. These marked ethnic differences led to the historical but misleading name “Mongolian spot,” though CDM is now preferred.

Clinically, CDM presents as flat, macular patches colored slate gray, bluish-gray, blue-green, or blue-black depending on baseline skin tone [5]. The hue is attributed to the Tyndall effect, where light scatters through dermal collagen overlying melanocyte clusters [5]. Borders are indistinct, and lesions may be round, oval, or irregular [6]. Sizes vary from 1-2 cm macules to large patches covering much of the back or extremities. Most infants have a single lumbosacral lesion, though multiple scattered lesions may occur [4].

The lumbosacral region accounts for >80% of cases, with other sites including shoulders, upper back, and proximal extremities [4-11]. Atypical locations are rare: extremity lesions occur in ~1%, and non-sacral trunk lesions in ~4% [4]. Case reports describe unusual sites such as the scalp or soles; Cho et al., reported a lesion on the foot [18]. Figure 2 shows an atypical patchy presentation of CDM in an infant with follow-up findings in toddlerhood

CDM is present at birth or shortly after, often identified during newborn exam. Lesions may darken in the first year, then fade. Most resolve by ages 4-6, and nearly all by puberty [5-11]. Persistence into adolescence or adulthood is uncommon but more likely with large, deeply pigmented patches. These remain benign with no malignant potential,



Table 1: Differential Diagnosis of Congenital Dermal Melanocytosis

Condition	Typical Onset	Location	Color	Borders	Tenderness	Course
CDM (Mongolian Spot)	At birth or shortly after [11]	Lumbosacral region, buttocks, shoulders, limbs [12]	Bluish-gray to blue-black [3]	Irregular, wavy [13]	Non-tender [4]	Fades by puberty in most cases [13]
Bruising (Ecchymosis)	After trauma or injury [13]	Any body area, especially bony prominences [14]	Blue, purple, or yellow-green; changes over time [6]	Poorly defined; evolves [4]	Often tender [15]	Resolves within days to weeks [6]
Nevus of Ota	Congenital or early childhood [15]	Unilateral face: periorbital area, forehead, sclera [16]	Blue-gray or blue-brown [10]	Patchy or poorly defined [1]	Non-tender [15]	Persists throughout life [15]
Nevus of Ito	Congenital or early childhood [2]	Supraclavicular area, upper back, shoulders [3]	Bluish-gray [16]	Poorly defined [16]	Non-tender [14]	Persists throughout life [15]
Blue Nevus	Usually in childhood or adolescence [15,16]	Localized anywhere, especially on hands, feet, buttocks [15]	Blue or blue-black [14]	Well-circumscribed [15]	Non-tender [15]	Stable and persistent [14]



Figure 2: Dark macules from CDM on the back at presentation and follow-up [4].

though they may cause cosmetic concern or be mistaken for bruising [5-11].

Recognition in skin of color requires careful attention. In darker phototypes (IV-VI), lesions may blend with baseline pigmentation and be overlooked [19]. In lighter brown skin (III-IV), slate-gray patches are more conspicuous. Providers may underrecognize lesions in very dark skin due to minimal contrast, or overinterpret normal variation in medium-brown skin as pathologic [20]. Dermatoscopy is rarely used but can be more challenging in darker skin because background melanin obscures features [21]. In practice, clinical awareness remains the most useful diagnostic tool.

Congenital Dermal Melanocytosis versus Bruising: Diagnostic Challenges

Mongolian spots are often referred to as “bruise look-alikes” because of their color and common lumbosacral location [4]. In a review of 253 pediatric forensic cases, Kettner et al., found that CDM was the most frequently identified lesion, comprising 37% of positive findings, and

strongly resembled bruises, especially on the lower back and buttocks [5]. Both CDM and bruises may appear as flat, blue to blue-green macules or patches of varying size and shape, making misidentification possible at an initial visit [13].

Several clinical clues can help distinguish the two. One key feature is time course: bruises change color as they heal progressing from blue or purple to green, yellow, and brown before resolving in days to weeks while CDM remains stable, fading only gradually over months or years [6-19]. Re-examination after 1-2 weeks is particularly useful: a bruise should improve or disappear, whereas CDM persists unchanged [5].

Tenderness and swelling are also distinguishing factors. Bruises often cause pain or inflammation; infants may cry or withdraw when palpated. CDM, being dermal pigmentation, is non-tender and elicits no reaction to pressure [19-22]. Morphology and distribution further help: bruises may show patterned shapes (handprints, belt marks) or appear in multiple sites of varying ages, while CDM typically has amorphous, symmetric borders and clusters over the lumbosacral region, rather than on shins, forearms, or bony prominences [6].

Age of onset is equally important. CDM is present at birth or shortly after [22]. By the time an infant is evaluated for bruising, parents and providers usually know of its presence. A new pigmented lesion in a toddler or older child without prior documentation is more likely a bruise. Although rare cases of “late-onset” dermal melanocytosis exist, they are exceptional and often linked to conditions like neurocutaneous melanosis [25,26]. Documentation at birth often with diagrams in the neonatal chart remains invaluable for avoiding later confusion [23,24].

In general, suspicious bruises occur in unusual locations, multiple patterns, or in non-mobile infants with lesions of different ages, while CDM lesions are static, congenital, and not linked to trauma [22]. Taken together, stable color, non-tenderness, characteristic morphology, congenital onset, and newborn documentation allow clear distinction of CDM from bruises [13]. A summary of these distinguishing features is provided in Table 2.

Clinically, distinguishing a Mongolian spot from a bruise may be straightforward for an experienced dermatologist or pediatrician, but can



Table 2: Key Differences Between Congenital Dermal Melanocytosis and Bruises

Feature	Congenital Dermal Melanocytosis (Mongolian spot)	Traumatic Bruise (Ecchymosis)
Onset	Present at birth or shortly after (congenital)	Appears after injury, not present at birth
Evolution over time	Color stable for weeks, fades gradually over years	Color changes over days: red/purple → green/yellow → resolves in 1–3 weeks
Tenderness	Non-tender, child comfortable with palpation	Often tender or sore initially, child may react to touch
Swelling	Flat without swelling or inflammation	May have mild swelling or firm texture when fresh
Color	Blue-gray, blue-green, or slate blue, does not blanch with pressure	Initially purple/blue or red, may blanch if fresh, later turns yellow-brown
Borders	Ill-defined, feathery edges with gradual fade	Sharper edges or distinct shapes, more well-demarcated than CDM
Distribution	Lumbosacral, shoulders, back, thighs in dark-skinned infants Symmetrical or random	Buttocks, thighs, face, arms Pattern of blows or grabbing (clustered or linear) Various stages of healing
Associated findings	No other trauma, normal skin, well-appearing child	May have cuts, fractures, irritability, bruises of different ages
Change with pressure	No blanching	May blanch if recent; older bruises do not
Resolution	Fades by age 4–6, may persist lighter	Heals in days to weeks, no lasting mark

be difficult for those without prior training. Dermatology consultation is often helpful when uncertainty exists. Dermatoscopy can aid evaluation: Mongolian spots show a homogeneous bluish pigment without the red-purple vascular tones typical of a contusion [19]. In one forensic case, a multidisciplinary team used a dermatoscope and confirmed uniform pigmentation without hemoglobin breakdown, ruling out bruising [6].

Short-interval re-examination is also recommended when doubt remains. Kettner et al., advised that any pigmented lesion noted during an abuse evaluation should be reassessed after 1–2 weeks to determine whether it resolves or changes [5]. Their group proposed a classification system for documenting suspected CDM at the initial exam, incorporating examiner certainty, lighting conditions, and confounding dermatologic findings such as diaper rash. This approach acknowledges that one exam may not be sufficient and that follow-up under proper conditions or by a more experienced examiner can prevent mislabelling a birthmark as a bruise or vice versa [12].

The most critical preventive step is thorough documentation and communication. When Mongolian spots are identified, providers should record their size, shape, and location in the medical record and, if possible, give caregivers written confirmation. This allows families to present documentation if markings are later questioned by another provider or childcare professional. Providers are trained to be cautious in detecting abuse [22], but clear documentation and forewarning can prevent false accusations. Social service and child protection agencies in many regions also include Mongolian spots in training materials as common mimics that must be excluded before pursuing an abuse evaluation [25]. Nevertheless, despite these safeguards, misdiagnoses continue to occur.

Case Reports of Misdiagnosis: CDM Mistaken for Abuse

Published case reports and series provide powerful insight into the real-world consequences of mistaking congenital dermal melanocytosis (CDM) for signs of abuse. Together, these accounts emphasize that misdiagnosis is not confined to one country or system but arises wherever awareness of CDM is limited.

A striking early example comes from Eastern Europe. Rzepczyk et al.,

described a two-week-old Roma infant in Poland whose foster parents observed bluish macules on the buttocks and lower back [6]. Believed to be bruises, the lesions prompted an official abuse investigation. Initial forensic review even supported trauma, but subsequent assessment by dermatologists and forensic physicians using careful lighting, dermatoscopy, and record review confirmed the spots as benign Mongolian marks. The case was dismissed, highlighting how specialist input and access to newborn documentation can prevent wrongful accusations.

Comparable situations have been documented in Germany. Kolbe et al., reported three siblings repeatedly investigated for abuse after daycare staff and pediatricians noted gray-blue patches on their backs and limbs [26]. Despite early confirmation of dermal melanocytosis, the family faced renewed scrutiny months later, underscoring the persistent alarm these lesions can cause. Similarly, Schlepper et al., described Nigerian siblings with atypical lesions on the thighs, shoulders, and lower back [4]. Initially thought to be traumatic bruises, the lesions remained unchanged on follow-up and were ultimately confirmed as CDM, with the presence of similar findings in both siblings serving as an important diagnostic clue.

Even more challenging are unusual presentations outside the neonatal period. Prasad and Tully reported a six-year-old boy in the United Kingdom who developed slate-gray macules on the back and limbs [19]. The late onset of pigmentation, far beyond infancy, raised immediate suspicion of inflicted injury. Dermatology consultation, however, identified the lesions as rare delayed-onset dermal melanocytosis. Comparable reports, such as Cho et al., documenting CDM on the soles of an infant’s feet, demonstrate how atypical timing or location can mislead clinicians unfamiliar with the full spectrum of presentation [18].

Taken together, these cases summarized in Table 3 share recurring themes. Most involve children from ethnic minority or darker-skinned populations, consistent with the epidemiology of CDM [5-17]. Lesions often appeared on sites commonly associated with trauma, such as the buttocks, back, or thighs, triggering child protection referrals by concerned caregivers or professionals. In several instances, families endured separation or prolonged investigation until dermatologic confirmation established the true diagnosis [6-27]. These cases underscore the critical



Table 3: Selected Reported Cases of CDM Misdiagnosed as Child Abuse

Case (Citation)	Patient(s)	Lesion Description & Location	Initial Action	Resolution
Rzeczyk et al., 2024a (Poland) [6]	2-week-old Roma infant girl	Pale-blue patches on sacrum and buttocks	Hospitalized; abuse investigation launched	Dermoscopy confirmed CDM; abuse ruled out
Kolbe et al., 2021 (Germany) [26]	2-month-old girl + 2 sisters	Multiple slate-gray macules on back and extremities	Infant admitted for suspected abuse; re-investigated at 15 months	Forensic exams twice confirmed CDM; documentation provided
Prasad & Tully, 2017 (UK) [19]	6-year-old boy	New blue-gray macules on back and limbs	Teacher suspected abuse; social services notified	Dermatology diagnosed late-onset dermal melanocytosis
Schlepper et al., 2024a (Germany) [4]	8-year-old boy + 18-month-old sister (Nigerian descent)	Boy: large thigh patches; Girl: 4 spots on back/shoulder + diffuse sacral discoloration	Taken into custody; lesions seen as bruises	Follow-up showed unchanged lesions → CDM; children returned home

need for systematic documentation of CDM at birth, interdisciplinary collaboration during evaluations, and greater education of healthcare providers regarding benign pigmentary findings in diverse skin tones.

Many others are cited in the pediatric and forensic literature. In a recent systematic review, King & Pope found that dermatologic conditions are among the most common conditions to be initially misdiagnosed in the evaluation of pediatric abuse. However, in their review, this included eczema and other rashes being misdiagnosed as burns or injuries. Mongolian spots were also cited as a classic pigmentary mimic in the differential diagnosis [28].

Conversely, real bruises can be initially misdiagnosed as Mongolian spots, causing a failure to recognize abuse on the first opportunity. This would presumably be much less common, as most infants with Mongolian spots are identified early in life. However, one can imagine the alternative scenario of a healthcare professional who is aware of Mongolian spots being too readily convinced by a caregiver's reassurance that a lesion is "just a birthmark." Rojas et al., performed an experimental study on implicit bias in the recognition of child abuse. They found that some clinicians may under-call abuse in children of specific backgrounds due to assumptions or incomplete exam [29]. Concrete reports of missing abuse due to confusion with CDM are less common but need to be balanced against false positives. The principle is clear: each concerning lesion should be evaluated on its own merits.

Cultural Practices and Other Dermatologic Mimics

Clinicians should maintain a broad differential diagnosis when evaluating possible child abuse. While Mongolian spots are the most frequently cited bruise mimics, other benign conditions medical and cultural may also be misinterpreted, particularly in children from communities with traditional healing practices.

Cultural practices can leave marks that resemble inflicted injuries. Coining (cao gio), common in Southeast Asia, involves rubbing a coin or spoon on oiled skin, producing linear red-purple petechiae that mimic whip marks [31]. Cupping, practiced in East Asian, Latin American, and Middle Eastern cultures, uses heated cups to create suction, leaving circular ecchymoses that may be mistaken for bite or suction injuries [32]. Gua sha causes streaky petechiae [33], while moxibustion can create small burn scars similar to cigarette burns [34]. Kannan reviewed multiple examples of such benign practices being misclassified as abuse [35]. Clinicians should ask families about alternative therapies in a nonjudgmental way parents often clarify with simple explanations like, "We did cupping for his fever." Education is also important: families should be informed that these practices can be misinterpreted in schools or childcare settings. Viero et al., similarly recommended including cultural history in child abuse evaluations [37].

Medical conditions can also mimic inflicted trauma. CDM itself is benign but easily mistaken for bruising. Bullous impetigo and staphylococcal scalded skin syndrome may mimic scald burns and have contributed to wrongful abuse accusations [25]. Phytophotodermatitis from plant sap and sunlight produces streaky burns resembling splash or immersion burns. Bleeding disorders, including Ehlers-Danlos syndrome, can cause extensive bruising after minimal trauma [38]. Urticaria pigmentosa (cutaneous mastocytosis) presents with brown patches that swell and redden with rubbing (Darier's sign), sometimes misread as slap marks; one infant case of congenital mastocytosis was initially suspected as abuse until biopsy confirmed the diagnosis [39]. Severe diaper dermatitis may also be misleading when ulcerated or infected. Caldas et al., described ulcerated diaper dermatitis mistaken for inflicted injury because of its raw, wound-like appearance [40]. These examples underscore the importance of dermatologic expertise in suspected abuse cases.

Pigmentary disorders are another category of mimics. In addition to CDM, dermal melanocytoses such as nevus of Ota (bluish pigmentation on the face in the trigeminal distribution, often near the eye) may resemble a black eye, while nevus of Ito appears on the shoulder or supraclavicular area [27]. Blue nevus can also resemble CDM, though it usually presents as a solitary, well-circumscribed lesion (Table 2). While less diffuse than Mongolian spots, these congenital pigmentary lesions can still be mistaken for bruising.

In summary, evaluating suspected abuse requires awareness of both cultural practices and medical conditions that mimic injury. As Jinna et al., emphasized, "kids are not just little people" — their skin presents differently than adults [41]. A careful, balanced approach that combines thorough history-taking with dermatologic expertise helps clinicians avoid misdiagnosis while ensuring that true cases of abuse are not overlooked.

Impact of Misdiagnosis and the Role of Bias

The misidentification of congenital dermal melanocytosis as abuse has serious consequences for families and the healthcare system. False accusations may lead to investigations, court proceedings, and temporary custody loss [41]. Several reports describe infants removed from parents for days to weeks until CDM was confirmed [6]. Even after reunification, families often experience distress and distrust, with some avoiding future care out of fear of renewed accusations [9]. Thus, misdiagnosis erodes the doctor-patient relationship and creates long-term barriers to care.

For children, separation from caregivers is acutely stressful, and misdiagnosis may result in unnecessary procedures full-body exams, x-rays, or blood tests that cause discomfort and risk. While child protection is vital, pursuing it on erroneous grounds is avoidable harm.



The opposite error failing to identify true abuse can be equally dangerous, leaving children at risk of further injury or death. Accuracy is therefore critical, yet bias often clouds judgment. Black children in the U.S. are about twice as likely as white children to be reported to child protective services by age 18, with many reports unsubstantiated [42]. While socioeconomic factors contribute, racial bias influences over-reporting of benign findings in minority families [9]. Clinicians may suspect abuse more readily in minority children while downplaying concerns in families perceived as “safe.”

Bias also affects dermatologic assessment. In a 2022 study, Shanmugavadivel et al., found that among 432 professionals, the mean score for identifying pediatric skin conditions in darker tones was only ~5.37/10, with just 11% passing; eczema was recognized only 40% of the time [43]. Although not abuse-specific, this highlights difficulty interpreting darker skin. Mongolian spots historically illustrated mainly in fair-skinned infants are particularly misinterpreted. Lester et al., noted that dermatology texts disproportionately feature light skin, perpetuating diagnostic gaps [44]. While inclusive image libraries are now emerging, decades of underrepresentation still affect practice [45].

Cultural bias further complicates assessment. In the Polish Roma infant case, discrimination toward the Roma community may have influenced how quickly abuse was suspected [6]. Cultural competence helps: awareness of practices such as coining or cupping, and knowledge that CDM is common in specific groups, promotes more objective evaluation.

Diagnostic overshadowing is another risk. Genuine injuries may coexist with CDM and be misclassified as additional bruises, inflating abuse concerns; conversely, bias may cause true bruises to be dismissed as benign. Training and standardized protocols aim to reduce such errors. The TEN-4 rule (bruising on the Torso, Ears, or Neck in children under 4 years is high risk) provides guidance [46]. Importantly, while buttock lesions in infants require investigation under this rule, CDM must remain in the differential, especially in infants of color.

Overall, CDM is benign but often misunderstood. Case reports worldwide show that misdiagnosis can lead to investigations, family separation, and serious emotional and legal consequences [6-27]. Cultural practices such as coining, cupping, and moxibustion, and medical conditions including bullous impetigo, phytophotodermatitis, bleeding disorders, and mastocytosis, further complicate assessment [25-40]. Awareness of these mimics, along with systematic documentation and follow-up, is essential to prevent false allegations.

DISCUSSION

Congenital dermal melanocytosis in skin of color represents a classical “trap” in pediatric dermatology and child abuse diagnostics – a benign condition that can masquerade as something sinister. The discussion surrounding this topic encompasses improving clinical recognition, enhancing education, and refining protocols to prevent errors.

Clinical Relevance

For primary clinicians including pediatricians, family physicians, emergency physicians, and dermatologists recognizing congenital dermal melanocytosis (CDM) is essential both to prevent false abuse allegations and to reassure caregivers. With basic familiarity, most cases of CDM are readily identifiable, as Mongolian spots are highly pathognomonic once recognized. To reinforce this, some hospitals include CDM in newborn exam checklists, ensuring early documentation. In child protection evaluations, dermatologists are now routinely part of hospital teams or available for consultation, helping to ensure that dermatologic mimics are considered in the differential [25]. Similarly, guidelines for child protection medical assessments in the UK and several European countries explicitly recommend documenting dermal melanocytosis to avoid confusion.

Education and Training

One important takeaway is the need for more images and clinical scenarios in medical education. As Shanmugavadivel et al., demonstrated, healthcare workers worldwide still struggle to identify conditions in darker skin [43]. Medical schools and residency programs are gradually modernizing curricula to include skin of color dermatology, and newer pediatric dermatology texts now feature side-by-side images of the same condition in light and dark skin.

Simulation and case-based learning can further improve recognition. For example, an Objective Structured Clinical Examination station could ask residents to differentiate between a bruise and a Mongolian spot on a standardized patient or high-quality image and explain their reasoning. These approaches align with broader efforts to expand inclusive imagery and move away from oversimplified racialized frameworks in dermatology [45-47]. Skin conditions should not be taught as if they occur only in one skin tone. By reforming representation in education, we can train future clinicians to avoid mislabeling CDM as abuse.

Interdisciplinary Approach

The evaluation and management of suspected child abuse is inherently multidisciplinary, involving dermatologists, paediatricians, radiologists, social workers, and sometimes law enforcement. This review supports a model in which the threshold for dermatology consultation should be low. Many child abuse expert teams already include a clinician with dermatology training or experience in evaluating mimics of abuse. Maguire et al., systematically reviewed common mimics and emphasized specialty referral—for example, osteogenesis imperfecta for fractures or dermatology for skin findings [48]. Within dermatology, familiarity with ethnic skin differences is critical. A dermatologist of color, or one with extensive experience in diverse populations, may provide key insight in cases of potential CDM. In several reported cases, it was the dermatologist or an experienced forensic physician whose intervention ultimately corrected a misdirected investigation [6].

Policy and Documentation

On a policy/systemic level, changes like these might also reduce the occurrence of misdiagnoses. Hospitals could have policies requiring that any pigmented lesion that could be mistaken for a bruise in an infant of color should be charted and re-examined by a second clinician 24-48 hours later, before determining that there has been abuse (unless there is other clear evidence of abuse). Child protective services could include dermatology consults as part of their standard protocol for unexplained skin lesions in young children. Some jurisdictions have already implemented these systems [19]. Another policy element could be standardizing how and where Mongolian spots are noted in the medical record, as was previously mentioned [22]. If every pediatrician charts these skin findings on newborn visit forms, then any provider seeing the infant later can easily cross-check that information. In the electronic age, having even a photograph on file, with parental consent, of the infant’s Mongolian spot could be helpful in the future.

Bias Mitigation

Awareness is a step toward mitigating implicit bias. A cultural competency training module can be part of child abuse evaluation training. The CHAMP (Child Abuse Medical Provider Program) trainings offered in New York, for example, include the module “Promoting Unbiased and Inclusive Care” with Mongolian spots misinterpreted as bruising as one scenario [49]. Educating clinicians about their implicit biases can help them take steps to mitigate the effects of bias, such as relying on validated tools for assessment rather than intuition, and obtaining a “second pair of eyes” from a colleague when in doubt. Ideally, the evaluation is an equitable process, and the same findings and results lead to the same interpretation regardless of the child’s race or background.



Future Directions

Congenital dermal melanocytosis is a benign pigmentary condition, yet its misidentification as bruising continues to generate profound clinical, social, and legal consequences. Affecting up to 80–90% of infants of Asian and African descent compared to fewer than 10% of Caucasian infants [5-17], CDM is one of the most common mimics of child abuse. Its well-documented features include bluish-gray patches, typically on the lumbosacral region, that fade with age [3-15]. Nevertheless, cases persist where CDM is mistaken for inflicted trauma, particularly when lesions appear in atypical sites or when documentation at birth is absent [13-27].

Future directions to address this challenge involve technological, educational, research, and policy initiatives. Advances in artificial intelligence and machine learning show promise in differentiating bruises from benign pigmentary conditions across skin tones [50]. Such tools may be especially valuable in pediatrics, where recognition of disease in darker skin has historically lagged [21-43]. Education is another priority. For decades, medical curricula underrepresented skin of color [7-44], but inclusive atlases and image libraries are now emerging [45-50]. Incorporating these into training and continuing education could improve diagnostic confidence. At the community level, hospitals that provide handouts for new parents [23], and outreach for teachers or childcare providers may reduce unnecessary referrals by building baseline awareness.

Research gaps remain considerable. Current literature consists mostly of case reports or small series [4,6]. Larger multicenter studies and registries are needed to determine the true incidence of CDM-related misdiagnosis, document family outcomes, and assess which interventions are most effective. Prospective evaluation of systematic documentation of birthmarks at delivery, already recommended in pediatric dermatology [1,2], should also be prioritized as a preventive strategy. Policy-level analyses reveal racial disproportionality in child protective reporting [8-42], reinforcing the value of standardized tools such as the TEN-4 rule. The TEN-4 rule highlights that bruising on the torso, ears, or neck in children under four years of age, or any bruising in infants younger than four months, is highly concerning for abuse [46]. While this framework improves consistency, it must be applied with nuance, as CDM often appears on the buttocks and lower back locations that could otherwise be misclassified as suspicious bruising [48]. Future studies should examine how decision tools perform across diverse populations and whether refinements can increase specificity without reducing sensitivity.

Language reform represents another important future direction. The term “Mongolian spot” has been criticized for its ethnic implications [3-20]. Adopting neutral terminology such as congenital dermal melanocytosis promotes accuracy without reinforcing stereotypes and is increasingly supported in the literature [10-16]. Alongside this, fostering cultural competence recognizing that CDM is more prevalent in certain groups and that practices such as cupping or coining can mimic bruising remains essential.

In sum, advancing recognition of CDM requires technological innovation, expanded education, larger research efforts, systematic documentation, careful application of decision rules such as TEN-4, and culturally sensitive language. Together, these strategies offer a path to reduce false abuse allegations while maintaining vigilance for true maltreatment.

CONCLUSION

Congenital dermal melanocytosis, or Mongolian spots, is a common pigmentary birthmark seen in infants with skin of color. While benign, these spots can be mistaken for bruising, leading to false accusations of child abuse. This review highlights the importance of distinguishing between Mongolian spots and true bruises. Key differences include congenital onset, color stability, and typical distribution, versus the

changing appearance and tenderness of bruises.

Misdiagnosis can harm innocent families or endanger children, emphasizing the need for clinicians to be knowledgeable and systematic in their assessments. Given the high prevalence of CDM in certain populations, healthcare providers must quickly recognize these birthmarks. Education reforms are essential to enhance training on skin conditions in darker skin tones and promote cultural competency.

Additionally, addressing implicit biases through standardized protocols can improve diagnostic accuracy for all children. Documenting birthmarks at birth can help prevent future misunderstandings. Dermatologists should advocate for their role in multidisciplinary teams, educate peers and the public, and collaborate with pediatricians to reassure families about benign conditions like CDM.

Overall, understanding skin of color is vital for equitable healthcare. By fostering awareness and collaboration, we can protect families from the trauma of false abuse allegations while ensuring that genuine cases of abuse are adequately addressed.

AUTHOR CONTRIBUTIONS

Conceptualization, C.P.; methodology, C.P., K.W.; software, C.P.; validation, C.P., K.W., I.F., E.G., N.G., and F.J.; formal analysis, C.P., K.W., I.F., E.G., N.G., and F.J.; investigation, C.P., K.W., I.F., E.G., N.G., and F.J.; resources, C.P.; data curation, C.P.; writing—original draft preparation, C.P., K.W., I.F., E.G., N.G., and F.J.; writing—review and editing, C.P., K.W., I.F., E.G., N.G., and F.J.; visualization, C.P.; supervision, C.P.; project administration, C.P. All authors have read and agreed to the published version of the manuscript.

REFERENCES

1. Chua RF, Pico J. Dermal melanocytosis. In StatPearls. StatPearls Publishing: Treasure Island, FL, USA. 2023.
2. Zhu J, Cen Q, Chang R, Han Y, Lin X. Patchy Dermal Melanocytosis: Differential Diagnosis and Management. *J Cosmet Dermatol.* 2025; 24: e16607.
3. Gupta D, Thappa DM. Mongolian spots. *Indian J Dermatol Venereol Leprol.* 2013; 79: 469-478.
4. Schlepper S, Hagen M, Schulz R, Schmeling A. Atypical localized Mongolian spots in dark pigmented skin - a challenge for forensic medical examination. *Int J Legal Med.* 2024; 138: 2065-2068.
5. Kettner LO, Rønholt AM, Barington T, Jakobsen M, Børresen M, Olsen PR. Dermal melanocytosis in children: Ethnic variation in prevalence. *Pediatr Dermatol.* 2020; 37: 97-103.
6. Rzepczyk S, Świdorski P, Rusek D, Czerwik J, Żaba R, Żaba C. The so-called Mongolian spots and suspected child abuse – difficulties in differential diagnosis. *Arch Forensic Med Criminol* 2024; 74: 221-227.
7. Syder NC, Omar D, McKenzie S, Brown-Korsah JB, Taylor SC, Elbuluk N. Gaps in medical education curricula on skin of color in medical school, residency, and beyond: Part 1. *J Am Acad Dermatol.* 2023; 89: 885-892.
8. LaBrenz CA, Littleton T, Shipe S, Bai R, Stargel L. State Policies on Child Maltreatment and Racial Disproportionality. *Child Youth Serv Rev.* 2023; 151: 107048.
9. Palusci VJ, Botash AS. Race and Bias in Child Maltreatment Diagnosis and Reporting. *Pediatrics.* 2021; 148: e2020049625.
10. Chua J, Pico A. Pigmentary disorders in children: Diagnostic approach and review. *Clin Dermatol.* 2023; 41: 123-132.
11. Sajgane A. Study of skin condition in newborn. *Int J Sci Res.* 2021; 29-32.



12. Kettner M, Birngruber CG, Niess C, Baz-Bartels M, Bunzel L, Verhoff MA, et al. Mongolian spots as a finding in forensic examinations of possible child abuse-implications for case work. *Int J Legal Med.* 2020; 134: 1141-1148.
13. Rzepczyk A, Szewczyk A, Jaczynska K, Czarnecka M, Mazur A, Feleszko W. "Mimics" of injuries from child abuse: Case series and review of the literature. *Children (Basel).* 2024; 11: 1103.
14. Schlepper A, Dunst K, Klein J. Dermal melanocytosis in pediatrics: Clinical pearls and pitfalls. *Eur J Pediatr Dermatol.* 2024; 34: 12-19.
15. StatPearls. Dermal melanocytosis. StatPearls Publishing: Treasure Island, FL, USA, 2024.
16. Zhu Y, Lin C, Huang J, Tan R. Embryology and pathogenesis of pigmentary birthmarks. *J Pediatr Invest.* 2024; 6: 14-20.
17. Quazi S, Choudhary S, Singh AL, Saoji V, Khan K, Jawade S. The study on the prevalence of Mongolian spots in the neonates. *J Family Med Prim Care.* 2023; 12: 1435-1438.
18. Cho SI, Moon J, Jo G, Lee C, Mun JH. Congenital Dermal Melanocytosis on the Foot: A Case Report and Review of the Literature. *Ann Dermatol.* 2019; 31: 213-216.
19. Prasad T, Tully J. Late onset congenital dermal melanocytosis - 'Mongolian blue spots' confused as child abuse: Are there more lessons to be learnt? *J Paediatr Child Health.* 2017; 53: 908-911.
20. Wilson, T. Skin color matters. *J Dermatol Physician Assist.* 2023; 17: 40-41.
21. Tripathy S, Warbasse E, Ronen S, Al-Rohil R, Cohen GF, Chen WS, Patel AB. Clinicopathologic correlation of dermatologic diseases in patients with darker pigmentation. *Am J Clin Pathol.* 2024
22. AlJasser M, Al-Khenaizan S. Cutaneous mimickers of child abuse: a primer for pediatricians. *Eur J Pediatr.* 2008; 167:1221-1230.
23. Gupta R. Mongolian spots: What are these and what their presence in baby mean for the parents? *Walsh Med Media* 2023.
24. Hilton L. Child abuse diagnosis requires careful analysis. *Dermatology Times.* 2015
25. Noble J, Hartwig E, Shwayder T. Cutaneous manifestations of physical and sexual child abuse. *Indian J Paediatr Dermatol.* 2020; 21: 1-6.
26. Kolbe V, Boy D, Büttner A. Mongolian Spots - A challenging clinical sign. *Forensic Sci Int.* 2021; 327: 110964.
27. Unejo MS, Khan MS, Mukhtar A. Ocular Features in a Case of Nevus of Ota. *J Coll Physicians Surg Pak.* 2017; 27: S56-S57.
28. King A, Pope E. Dermatitis versus nonaccidental trauma: A systematic review of initial pediatric misdiagnoses. *Pediatr Dermatol.* 2024; 41: 215-220.
29. Ojas M, Walker-Descartes I, Laraque-Arena D. An Experimental Study of Implicit Racial Bias in Recognition of Child Abuse. *Am J Health Behav.* 2017; 41: 358-367.
30. Chwartz KA, Metz J, Feldman K, Sidbury R, Lindberg DM; the ExSTRA Investigators. Cutaneous Findings Mistaken for Physical Abuse: Present but Not Pervasive. *Pediatr Dermatol.* 2014 Feb 26.
31. Killion CM. Cultural healing practices that mimic child abuse. *Ann Forensic Res.* 2017; 4: 1042.
32. Qin Y, Beach RA. Visual dermatology: Beyond bruising: Cupping in a North American context. *J Cutan Med Surg.* 2019; 23: 331-333.
33. Iwanitkit V. Culture-Bounded Skin Lesion - A Case Due to Chinese Gua Sha. *Indian J Dermatol.* 2017; 62: 441.
34. Zhou M, Wang C, Wu S. A Chinese mugwort cigarette generating device for moxibustion is treated. 2016.
35. Kannan RK. Cultural dermatoses: A review. *J Skin Sex Transm Dis.* 2022; 4: 33-39.
36. Morrone A. Understanding and working with traditional beliefs, cultures, and practices (cupping, coining, and other ethno-dermatoses). In Springer; Cham, Switzerland, 2020; 223-227.
37. Viero A, Amadasi A, Blandino A, Kustermann A, Montisci M, Cattaneo C. Skin lesions and traditional folk practices: a medico-legal perspective. *Forensic Sci Med Pathol.* 2019; 15: 580-590.
38. Atel B, Butterfield R. Common skin and bleeding disorders that can potentially masquerade as child abuse. *Am J Med Genet C Semin Med Genet.* 2015; 169: 328-336.
39. Porter E, Heffron C, Murphy LA, O'Connor C. Congenital cutaneous mastocytosis mistaken for non-accidental injury. *Pediatr Investig.* 2023; 7: 218-219.
40. Caldas SA, Murphy E, Habeshian K, Kirkorian AY, Hinds T. Ulcerated diaper dermatitis: Child abuse mimicker. *Pediatr Dermatol.* 2024; 41: 87-90.
41. Nna S, Livingston N, Moles R. Cutaneous sign of abuse: Kids are not just little people. *Clin Dermatol.* 2017; 35: 504-511.
42. Johnson K. Racial disparities in child protective services reporting. *Pediatrics.* 2021; 147: e2020023424.
43. Shanmugavadivel D, Liu JF, Buonsenso D, Davis T, Roland D. Assessing Healthcare Professionals' Identification of Paediatric Dermatological Conditions in Darker Skin Tones. *Children (Basel).* 2022; 9: 1749.
44. Lester JC, Taylor SC, Chren MM. Under-representation of skin of colour in dermatology images: not just an educational issue. *Br J Dermatol.* 2019;180: 1521-1522.
45. Osmani S, Itrube V, Sandoval-Belt P, Yi A, Phillips CM, Smidt AC. Inclusive dermatology: Creating a diverse visual atlas of skin conditions (with consideration of broader impacts on patient care and medical education). *J Am Acad Dermatol.* 2022; 87: AB175.
46. Ierce MC, Kaczor K, Lorenz DJ, Bertocci G, Fingarson AK, Makoroff K, et al. Validation of a Clinical Decision Rule to Predict Abuse in Young Children Based on Bruising Characteristics. *JAMA Netw Open.* 2021; 4: e215832.
47. Hosla NN, Grullon K, Rosenblatt AE. Prevention of racialized medicine in pediatric dermatology: A call to re-examine skin tone typing. *Pediatr Dermatol.* 2021; 38: 167-169.
48. Maguire S, Mann MK, Sibert J, Kemp A. Are there patterns of bruising in childhood which are diagnostic or suggestive of abuse? A systematic review. *Arch Dis Child.* 2005; 95: 170-176.
49. Malawaarachchi A. Promoting unbiased and inclusive care. *Upstate Golisano Children's Hospital, SUNY Upstate.* 2025.
50. Taylor M. Impact of diversity in training resources on self-confidence in diagnosing skin conditions in all skin tones: An international survey. *Front Pediatr.* 2022; 10: 850388.