

## Clinical Profile and Pattern of Pigmentary Disorders Among Children: A Cross-Sectional Study from a Tertiary Care Center

Dr Ranjitha M S<sup>1</sup>, Dr Sachin Halli<sup>2</sup>, Dr. Shantkumar<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Dermatology, Venereology and Leprosy, Mahavir Institute of Medical Sciences, Vikarabad, Telangana – 501101

<sup>2</sup>Assistant Professor, Department of Dermatology, Venereology and Leprosy, Mahavir Institute of Medical Sciences, Vikarabad, Telangana – 501101

<sup>3</sup>Assistant Professor, Department of Radio Diagnosis, Mahavir Institute of Medical Sciences, Vikarabad, Telangana - 501101 (Corresponding Author)

Email: [sajjanshantu90@gmail.com](mailto:sajjanshantu90@gmail.com)

### Abstract

**Background :** Pigmentary disorders constitute a diverse group of dermatological conditions in children, causing cosmetic concerns, psychological distress, and parental anxiety. Their clinical presentation differs from adults with respect to etiology, distribution, and associated disorders. Comprehensive epidemiological data from tertiary care centers remain limited.

**Objective :** To evaluate the clinical profile, pattern, and spectrum of pigmentary disorders among children attending a tertiary care dermatology center.

**Materials and Methods :** A hospital-based cross-sectional study was conducted among 200 children aged 0–15 years presenting with pigmentary skin disorders in the Department of Dermatology, Venereology and Leprosy, Vijayanagara Institute of Medical Sciences, Ballari, between January and December 2021. Detailed demographic information, clinical history, lesion characteristics, family history, associated cutaneous and systemic conditions, and relevant laboratory investigations were recorded. Data were analyzed using SPSS version 25.0.

**Results :** Hypopigmentary disorders constituted 81.5% of all pigmentary disorders, while hyperpigmentary disorders accounted for 18.5%. The most affected age group was 11–15 years (44.5%), with a slight female predominance (51%). Vitiligo was the most common pigmentary disorder (31.5%), followed by pityriasis alba (25.0%) and pityriasis versicolor (10.5%). Most lesions involved the head and neck region, particularly the cheeks. Associated cutaneous disorders were uncommon, whereas anemia represented the most frequent systemic association.

**Conclusion :** Hypopigmentary disorders predominated among pediatric pigmentary disorders, with vitiligo representing the leading diagnosis. Early recognition of clinical patterns facilitates accurate diagnosis, appropriate management, and effective counseling of affected children and their caregivers.

**Keywords :** Pigmentary disorders, Children, Vitiligo, Pityriasis alba, Hypopigmentation, Cross-sectional study

**How to cite this article:** Ranjitha MS, Halli S, Shantkumar. Clinical Profile and Pattern of Pigmentary Disorders Among Children: A Cross-Sectional Study from a Tertiary Care Center. Int J Drug Deliv Technol. 2026;16(76s): ; DOI: 10.25258/ijddt.16.76s.14

### Introduction

Skin pigmentation is primarily determined by the quantity, type, and distribution of melanin synthesized by epidermal

melanocytes, with additional contributions from hemoglobin and carotenoids. Normal pigmentation depends on the coordinated processes of melanocyte development,

melanosome formation, melanin synthesis, intracellular transport, and transfer of melanosomes to surrounding keratinocytes. Disturbances in any of these physiological mechanisms can result in a wide spectrum of hypopigmentary and hyperpigmentary disorders, which may be congenital or acquired and vary considerably in their clinical presentation and prognosis (1,2,3). Pigmentary disorders constitute a significant proportion of pediatric dermatological consultations and encompass a heterogeneous group of conditions with diverse etiologies, including genetic, autoimmune, inflammatory, infectious, nutritional, metabolic, and developmental abnormalities (3,4). Although the majority of these disorders are medically benign, they frequently lead to cosmetic disfigurement, psychosocial stress, low self-esteem, and considerable parental anxiety, particularly when lesions involve visible areas such as the face and neck. The psychological impact of pigmentary disorders during childhood may adversely influence social interaction and quality of life, making early diagnosis and appropriate counselling an integral component of patient management (4,5).

Pediatric pigmentary disorders differ from those encountered in adults with respect to their etiological spectrum, distribution, associated systemic disorders, and clinical behavior. Hypopigmentary disorders are generally more common in children and include vitiligo, pityriasis alba, nevus depigmentosus, post-inflammatory hypopigmentation, pityriasis versicolor, albinism, and Hansen's disease. Hyperpigmentary disorders include post-inflammatory hyperpigmentation, freckles, Becker nevus, melanocytic nevi, nevus of Ota, lichen planus pigmentosus, and several

congenital or developmental pigmentary anomalies (3,6,7). Accurate clinical differentiation among these conditions is essential because their management, prognosis, and need for long-term follow-up differ substantially.

Among pediatric pigmentary disorders, vitiligo is one of the most common acquired depigmenting disorders and is characterized by progressive destruction of functional melanocytes. Childhood vitiligo differs from adult-onset disease in terms of clinical presentation, disease activity, autoimmune associations, and prognosis (4). Pityriasis alba is another frequently encountered hypopigmentary disorder, particularly among younger children, and has been associated with atopy, xerosis, and excessive sun exposure (4,8). Similarly, pityriasis versicolor continues to be an important superficial fungal infection in tropical countries and contributes significantly to pigmentary abnormalities in children (3).

The epidemiology of pediatric pigmentary disorders varies considerably across different geographical regions owing to differences in ethnicity, environmental exposure, climatic conditions, socioeconomic factors, healthcare accessibility, and referral patterns. Previous Indian studies have demonstrated substantial variation in the prevalence of individual pigmentary disorders, with some reporting pityriasis alba as the predominant diagnosis, whereas others have identified vitiligo as the leading cause of childhood pigmentary disorders (8,9). Such regional differences highlight the importance of institution-specific epidemiological data to improve diagnostic accuracy and optimize patient care.

Despite the increasing burden of pigmentary disorders in pediatric

dermatology clinics, published data describing their overall clinical spectrum from tertiary care centers remain relatively limited. A comprehensive understanding of the demographic profile, lesion characteristics, anatomical distribution, associated cutaneous and systemic disorders, and relative frequency of various pigmentary conditions is essential for evidence-based clinical practice.

Therefore, the present cross-sectional study was undertaken to evaluate the clinical profile and pattern of pigmentary disorders among children attending a tertiary care dermatology center, with special emphasis on demographic characteristics, clinical presentation, lesion morphology, anatomical distribution, associated cutaneous and systemic conditions, and the relative frequency of individual pigmentary disorders.

## **Materials and Methods**

### **Study Design and Setting**

A hospital-based cross-sectional observational study was conducted in the Department of Dermatology, Venereology and Leprosy, Vijayanagara Institute of Medical Sciences (VIMS), Ballari, Karnataka, India.

### **Study Population**

The study included children aged 0–15 years presenting with pigmentary disorders to the Dermatology Outpatient Department during the study period. A total of 200 consecutive patients fulfilling the eligibility criteria were enrolled.

### **Inclusion Criteria**

- Children aged 0–15 years presenting with clinically diagnosed pigmentary skin disorders.
- Parents or legal guardians willing to provide written informed consent.

### **Exclusion Criteria**

- Pigmentary changes secondary to trauma or burns.
- Children whose parents or guardians declined to participate in the study.

### **Sample Size**

Based on previous hospital data, the estimated prevalence of pediatric pigmentary disorders was considered for sample size calculation. Assuming a 95% confidence interval and a 5% margin of error, the minimum required sample size was calculated to be 200 participants, all of whom were included in the final analysis.

### **Data Collection**

After obtaining written informed consent from parents or guardians, detailed demographic and clinical information was collected using a predesigned proforma. The recorded variables included age, sex, duration of illness, age at onset, presenting symptoms, history of similar lesions among family members, parental consanguinity, previous treatment history, and associated medical conditions.

Each participant underwent a comprehensive dermatological examination. Pigmentary lesions were evaluated for anatomical site, morphology, distribution, color, shape, symmetry, presence of scaling, mucosal involvement, and associated cutaneous findings. Whenever clinically indicated, examination for Koebner phenomenon, peripheral nerve involvement, and other disease-specific clinical signs was performed.

### **Diagnostic Evaluation**

The diagnosis of pigmentary disorders was established primarily on clinical examination. Relevant laboratory and diagnostic investigations were performed whenever required to confirm the diagnosis. These included potassium hydroxide (KOH) mount examination,

Wood's lamp examination, slit-skin smear, skin biopsy with histopathological examination, complete blood count, and other appropriate investigations based on the suspected clinical diagnosis.

### Outcome Measures

The primary outcome was the clinical pattern and frequency of various pediatric pigmentary disorders. Secondary outcomes included demographic characteristics, lesion morphology, anatomical distribution, duration of disease, associated cutaneous disorders, systemic associations, family history, parental consanguinity, and previous treatment practices.

### Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test. A p-value <0.05 was considered statistically significant.

### Results

**Table 1. Baseline demographic and clinical characteristics of study participants (N = 200)**

| Variable           | Frequency | Percentage (%) |
|--------------------|-----------|----------------|
| <b>Age (years)</b> |           |                |
| 0–5                | 45        | 22.5           |
| 6–10               | 66        | 33.0           |
| 11–15              | 89        | 44.5           |
| <b>Gender</b>      |           |                |
| Male               | 98        | 49.0           |
| Female             | 102       | 51.0           |
| <b>Symptoms</b>    |           |                |
| Asymptomatic       | 175       | 87.5           |
| Itching            | 25        | 12.5           |

| Duration of lesions |     |      |
|---------------------|-----|------|
| Since birth         | 21  | 10.5 |
| 1–6 months          | 128 | 64.0 |
| 7–12 months         | 6   | 3.0  |
| 1–3 years           | 34  | 17.0 |
| 4–6 years           | 9   | 4.5  |
| >6 years            | 2   | 1.0  |

**Table 2. Distribution of pigmentary disorders among study participants**

| Pigmentary disorder                 | Number of Cases | %    |
|-------------------------------------|-----------------|------|
| Vitiligo                            | 63              | 31.5 |
| Pityriasis alba                     | 50              | 25.0 |
| Pityriasis versicolor               | 21              | 10.5 |
| Nevus depigmentosus                 | 18              | 9.0  |
| Post-inflammatory hypopigmentation  | 10              | 5.0  |
| Post-inflammatory hyperpigmentation | 8               | 4.0  |
| Hansen's disease                    | 4               | 2.0  |
| Others*                             | 26              | 13.0 |

**Table 3. Clinical characteristics of pigmentary lesions**

| Variable                  | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
| Head and neck involvement | —         | 49.8           |
| Trunk involvement         | —         | 24.4           |
| Lower limb involvement    | —         | 15.4           |
| Upper limb involvement    | —         | 13.8           |
| Irregular lesion shape    | 148       | 74.0           |
| Hypopigmented lesions     | 104       | 52.0           |
| Depigmented lesions       | 41        | 20.5           |

|                        |    |      |
|------------------------|----|------|
| Hyperpigmented lesions | 38 | 19.0 |
| Trichrome lesions      | 20 | 10.0 |
| Scaling present        | 57 | 28.5 |

**Table 4. Associated cutaneous and systemic conditions**

| Variable                              | Frequency | Percentage (%) |
|---------------------------------------|-----------|----------------|
| <b>Associated cutaneous disorders</b> |           |                |
| Atopic dermatitis                     | 5         | 2.5            |
| Acne vulgaris                         | 4         | 2.0            |
| Seborrheic dermatitis                 | 4         | 2.0            |
| Tinea corporis                        | 3         | 1.5            |
| Other dermatological conditions       | 16        | 8.0            |
| None                                  | 168       | 84.0           |
| <b>Systemic associations</b>          |           |                |
| Anemia                                | 5         | 2.5            |
| Epilepsy                              | 1         | 0.5            |
| None                                  | 194       | 97.0           |

## Discussion

The present cross-sectional study evaluated the clinical profile and pattern of pigmentary disorders among 200 children attending a tertiary care dermatology center. The findings demonstrated that hypopigmentary disorders constituted the majority of pediatric pigmentary disorders, with vitiligo emerging as the most common diagnosis, followed by pityriasis alba and pityriasis versicolor. Most patients belonged to the 11–15-year age group, with a slight female predominance. The head and neck region, particularly the face,

represented the most frequently affected anatomical site. These findings emphasize that pediatric pigmentary disorders remain an important component of dermatological practice and require early diagnosis and appropriate counseling because of their cosmetic and psychosocial implications.

Hypopigmentary disorders accounted for more than four-fifths of all pigmentary disorders in the present study. This predominance is consistent with the observations reported by Sori et al., who also demonstrated that hypopigmentary disorders were considerably more common than hyperpigmentary disorders among children presenting to a tertiary care hospital (8). Similarly, Babu and Prasad reported that hypomelanotic disorders represented the largest proportion of pediatric pigmentary diseases in clinical practice, highlighting the importance of careful clinical evaluation in this patient population (9). The higher frequency of hypopigmentary lesions observed in the present study may reflect increased parental concern regarding visible depigmentation, leading to earlier medical consultation.

The overall demographic profile observed in this study was comparable to previous Indian reports. The majority of children belonged to the 11–15-year age group, indicating that pigmentary disorders become more clinically apparent during late childhood and early adolescence. A slight female predominance was observed, which has also been reported by Sori et al. (8). This finding may be related to greater cosmetic awareness among female children and increased health-seeking behavior by parents for girls with visible pigmentary lesions.

Vitiligo was identified as the most common pigmentary disorder, accounting for nearly one-third of all cases. This finding differs

from some previous Indian studies in which pityriasis alba represented the predominant diagnosis (9). Regional variation, referral bias, climatic differences, genetic susceptibility, and healthcare accessibility may explain these differences in disease frequency. The high prevalence of vitiligo observed in the present study further emphasizes its importance as a major pediatric dermatological disorder requiring long-term follow-up and psychological support.

Among children diagnosed with vitiligo, the disease was more frequent in females and most commonly affected those aged 6–10 years. The predominance of vitiligo vulgaris and the relatively frequent occurrence of mucosal involvement and Koebner phenomenon observed in this study are comparable to findings reported by Reddy and Arun, who demonstrated vitiligo vulgaris as the commonest clinical subtype in childhood with similar demographic characteristics (10). The predominance of facial involvement observed in the present study is also consistent with the known predilection of childhood vitiligo for exposed body sites. Pityriasis alba was the second most common pigmentary disorder. Most patients were younger children, and lesions predominantly involved the face, particularly the cheeks, with scaling observed in a substantial proportion of cases. These observations closely resemble the findings of Vinod et al., who reported facial predominance, frequent scaling, and occurrence among younger children in their clinicoepidemiological study of pityriasis alba (11). The association of pityriasis alba with xerosis and atopic tendencies may explain its high prevalence in pediatric dermatology clinics.

Pityriasis versicolor represented another important cause of pigmentary abnormalities in the present study. Both hypopigmented and hyperpigmented variants were encountered, with truncal involvement predominating. Similar observations have been reported by Snekavalli et al., who described the trunk as the most common site and demonstrated that hypopigmented lesions were more frequent than hyperpigmented lesions among pediatric patients (12). The tropical climate and increased humidity may contribute to the relatively higher occurrence of this superficial fungal infection in India.

The head and neck region was the most frequently affected anatomical site in the present study. Facial involvement probably contributes to earlier clinical consultation because cosmetic disfigurement is readily noticed by both parents and children. Most lesions were irregular in shape, while hypopigmented lesions constituted the predominant color pattern. Surface scaling was observed in approximately one-fourth of patients and was particularly common in pityriasis alba and pityriasis versicolor. These findings are comparable with previously published pediatric studies evaluating pigmentary disorders (9,12).

Associated dermatological and systemic disorders were relatively uncommon. Atopic dermatitis represented the most frequent associated cutaneous disease, whereas anemia was the predominant systemic association. These findings are clinically relevant because coexistence of inflammatory dermatoses may contribute to post-inflammatory pigmentary changes and influence treatment outcomes. The low frequency of systemic disorders observed in the present study also supports the

generally benign nature of most pediatric pigmentary disorders.

The strengths of the present study include a relatively large sample size and comprehensive evaluation of both hypopigmentary and hyperpigmentary disorders within a single tertiary care center. Nevertheless, certain limitations should be acknowledged. The study was conducted at a single institution, limiting the generalizability of the findings. The cross-sectional design precluded assessment of disease progression, treatment response, and long-term outcomes. In addition, referral bias may have influenced the observed frequency of individual disorders because tertiary care centers often receive more complex cases. Overall, the present study provides valuable epidemiological information regarding the clinical spectrum of pediatric pigmentary disorders in a tertiary care setting. The findings highlight the predominance of hypopigmentary disorders, particularly vitiligo and pityriasis alba, and emphasize the importance of careful clinical examination, early diagnosis, and appropriate counseling to improve patient care and reduce psychological distress among affected children and their families.

## Conclusion

This cross-sectional study provides a comprehensive overview of the clinical profile and pattern of pediatric pigmentary disorders presenting to a tertiary care dermatology center. Hypopigmentary disorders predominated over hyperpigmentary disorders, with vitiligo emerging as the most common pigmentary disorder, followed by pityriasis alba and pityriasis versicolor. Most patients belonged to the 11–15-year age group, with a slight female predominance, and the head

and neck region, particularly the face, was the most frequently affected anatomical site.

The majority of children presented with asymptomatic lesions, while associated cutaneous and systemic disorders were relatively uncommon. Early recognition of the characteristic clinical patterns of common pigmentary disorders can facilitate accurate diagnosis, appropriate management, and timely counseling of patients and their caregivers. Since these conditions often have a significant psychosocial impact despite their generally benign nature, comprehensive clinical evaluation and parental reassurance remain essential components of pediatric dermatological care.

Further multicenter studies with larger sample sizes and long-term follow-up are warranted to better understand the epidemiology, disease progression, treatment outcomes, and quality-of-life impact of pigmentary disorders among children in different geographical regions.

## References

1. Anstey AV. Disorders of skin color. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. *Rook's Textbook of Dermatology*. 8th ed. Oxford: Blackwell Publishing; 2010.
2. McGrath JA, Uitto J. Structure and function of the skin. In: Griffiths C, Barker J, Bleiker T, Chalmers R, Creamer D, editors. *Rook's Textbook of Dermatology*. 9th ed. Oxford: John Wiley & Sons; 2016.
3. Dhar S, Dutta P, Malakar R. Pigmentary disorders. In: Valia RG, Valia AR, editors. *IADVL Textbook of Dermatology*. 3rd ed. Mumbai: Bhalani Publishing House; 2008.

4. Thappa DM. Pigmentary disorders. In: *Clinical Pediatric Dermatology*. Elsevier; 2009.
5. Lapeere H, Boone B, Schepper SD, et al. Hypomelanoses and Hypermelanoses. In: *Fitzpatrick's Dermatology in General Medicine*. 7th ed. McGraw-Hill; 2008.
6. Sarkar R, Das A, Katoch S. Hyperpigmentary disorders. In: Sacchidanand S, editors. *IADVL Textbook of Dermatology*. 5th ed. 2022.
7. Silverberg NB. Update on childhood vitiligo. *Curr Opin Pediatr*. 2010;22:445–452.
8. Sori T, Dyavannavar V, Jaisankar TJ, Thappa DM. Clinical profile of children with pigmentary disorders. *Int J Dermatol Venereol Leprol Sci*. 2020;3:8–13.
9. Babu AR, Prasad AM. A clinical study of pediatric hypomelanotic dermatoses at a tertiary care center. *Indian J Child Health*. 2019;6:654–657.
10. Gurralla Satyanarayan Reddy, Arun N. Clinicoepidemiological study of childhood vitiligo. *Int J Contemp Med Res*. 2019;6:C14–C15.
11. Vinod S, Singh G, Dash K, Grover S. Clinicoepidemiological study of pityriasis alba. *Indian J Dermatol Venereol Leprol*. 2002;68:338–340.
12. Snekavalli R, Madhu R, Ramesh A, Janaki C, Dhanalakshmi UR. Clinicoepidemiological and mycological study of pityriasis versicolor. *Int J Res Med Sci*. 2018;6:1963–1970.