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Original Research Article

Clinical profile with special reference to various skin manifestations of Pediatric SLE

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Abstract:

Background: Pediatric systemic lupus erythematosus (pSLE) is a multisystem autoimmune disease in which cutaneous manifestations are common and may precede systemic involvement. These lesions often reflect disease activity, yet pediatric-specific data on their clinical significance, particularly from resource-limited settings, remain limited. Standardized tools such as the Cutaneous Lupus Erythematosus Disease Area and Severity Index (CLASI) are not routinely used in children.

Objectives: To describe the pattern and spectrum of cutaneous manifestations in pediatric systemic lupus erythematosus and to evaluate their association with systemic involvement and clinical outcomes.

Methods: This cross-sectional observational study was carried out at a tertiary care facility in Eastern India between January 2024 and December 2025. Using successive sampling, children between the ages of 1 and 14 who met the SLICC 2012 categorization criteria for systemic lupus erythematosus were included. Comprehensive laboratory, systemic, dermatological, and clinical assessments were carried out. There are three subtypes of cutaneous lupus erythematosus: acute, subacute, and chronic. SPSS version 20.0.1 was used for the statistical analysis, and $p < 0.05$ was deemed significant.

Results: Eighty children were included (female:male ratio 3.4:1; mean age 11.1 ± 2.5 years). Cutaneous manifestations were present in 66 patients (82.5%). Malar rash (66.7%), photosensitivity (57.6%), oral ulcers (54.5%), and alopecia (45.5%) were the most frequent lesions. Acute cutaneous lupus erythematosus was the predominant subtype (63.6%). Cutaneous lesions were the first disease manifestation in 42.4% of patients. Significant associations were observed between malar rash and renal involvement ($p = 0.03$), vasculitic lesions and multisystem involvement including neurological disease ($p = 0.01$), and alopecia with hematological involvement ($p = 0.04$). Complete resolution of cutaneous lesions occurred in 50% of patients on follow-up, with better outcomes following combined topical and systemic therapy.

Conclusion: Cutaneous manifestations are highly prevalent in pSLE and often precede systemic disease. Certain lesions serve as markers of systemic involvement, highlighting the importance of early dermatological assessment and standardized monitoring in pediatric lupus.

Keywords: Pediatric systemic lupus erythematosus; cutaneous lupus erythematosus; CLASI; systemic involvement.

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Introduction

In the past, the facial rash that resembled a wolf's bite was referred to as lupus, which is derived from the Latin word for "wolf." Approximately 15–20% of instances of systemic lupus erythematosus (SLE), a chronic autoimmune disease with multisystem involvement, occur in children (pSLE) [1]. Children frequently have a more severe illness course than adults, with higher rates of involvement of the kidneys and central nervous system and more cumulative organ damage. [2,3].

Cutaneous manifestations are among the earliest and most recognizable features of pSLE, occurring in up to 80% of affected children [4,5]. Lesions such as malar rash, discoid lupus, photosensitivity, and alopecia not only cause cosmetic and psychosocial morbidity but also frequently reflect underlying systemic disease activity [6].

Early diagnosis of pSLE remains challenging due to its heterogeneous presentation and overlap with infectious or inflammatory conditions. Additionally,

commonly used classification criteria—including ACR, SLICC, and EULAR/ACR—are largely derived from adult populations, reducing their sensitivity in children and contributing to diagnostic delays, particularly in resource-limited settings [7,8].

Emerging evidence indicates that specific cutaneous findings may correlate with disease severity and internal organ involvement, especially lupus nephritis and hematologic abnormalities [5,9]. Despite this, pediatric-specific data—especially from low- and middle-income countries such as India—remain limited, and skin manifestations are often underrecognized.

With a focus on their function in early diagnosis and prognostic evaluation, this study attempts to methodically examine the pattern and clinical importance of cutaneous symptoms in pediatric systemic lupus erythematosus.

Materials and Methods

Design of the Study: This cross-sectional observational study was carried out in a hospital.

Study Environment: In cooperation with the Department of Dermatology, the study was conducted in the Department of Paediatrics at SVP Post Graduate Institute of Paediatrics and S.C.B. Medical College & Hospital, Cuttack.

Study Time: The investigation was carried out between January 2024 and December 2025, a span of two years.

Research Population: Children with Systemic Lupus Erythematosus (SLE) between the ages of 1 and 14 who visited the Outpatient Department (OPD) or were admitted to the Inpatient Department (IPD) of SVPPGIP and S.C.B. Medical College & Hospital, Cuttack, throughout the study period made up the study population.

Sampling Method and Sample Size: A successive sampling strategy was used to enroll all eligible children.

Criteria for Inclusion: All children between the ages of one and fourteen who meet the 2012 Systemic Lupus International Collaborating Clinics (SLICC) classification criteria for Systemic Lupus Erythematosus, whether or not they have cutaneous signs.

Exclusion Standards: Children whose parents or legal guardians declined to give their informed consent to participate in the study

Method of Collecting Information: After receiving signed informed consent from their parents or legal guardians, all eligible participants were registered. The data was collected using a structured form that had been previously developed and approved.

The thorough clinical history that was obtained comprised demographic data, presenting complaints, duration of sickness, previous medical history, family history, and treatment history. Anthropometric measurements, a systemic examination, and a comprehensive general physical examination came next.

To identify and record the different cutaneous signs of SLE, a thorough dermatological examination was conducted. Relevant laboratory procedures, such as complete blood counts, renal function tests, urine examinations, immunological tests, and other tests as clinically required, were performed in accordance with conventional protocols. In certain situations, skin biopsies were carried out when necessary to confirm the diagnosis.

Analysis of Statistics: SPSS version 20.0.1 was used to analyze the data after it was imported into Microsoft Excel. Frequencies, percentages, averages, and standard deviations were used to express descriptive statistics. Using the proper statistical procedures, the relationship between cutaneous symptoms and systemic involvement was evaluated. Statistical significance was defined as a p-value of less than 0.05.

Results

The findings for the research were described under following subsections

- Baseline characteristics of the study population
- Prevalence and Pattern of Cutaneous Manifestations
- Clinical Spectrum of Cutaneous Manifestations
- Correlation Between Cutaneous Manifestations and Systemic Involvement
- Clinical Outcome of Cutaneous Manifestations on Follow-up

1. Baseline Characteristics of the Population

Table 1: Study Subjects' Age Distribution (n = 80)

Age Category	Value
Mean age (years), Mean ± SD	11.1 ± 2.5
0–5 years, n (%)	7 (8.8)
6–10 years, n (%)	25 (31.3)
11–14 years, n (%)	48 (60.0)

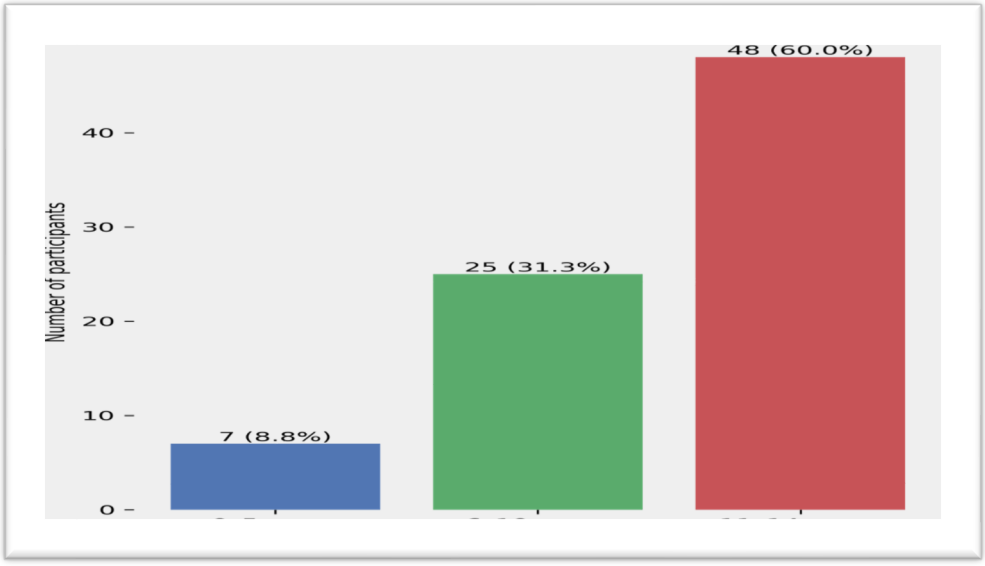

Figure 1: Age Distribution of Study Participants (n = 80)

Table 1: Gender Distribution of Study Participants (n = 80)

Gender	n (%)
Male	18 (22.5)
Female	62 (77.5)
Male : Female ratio	1 : 3.4

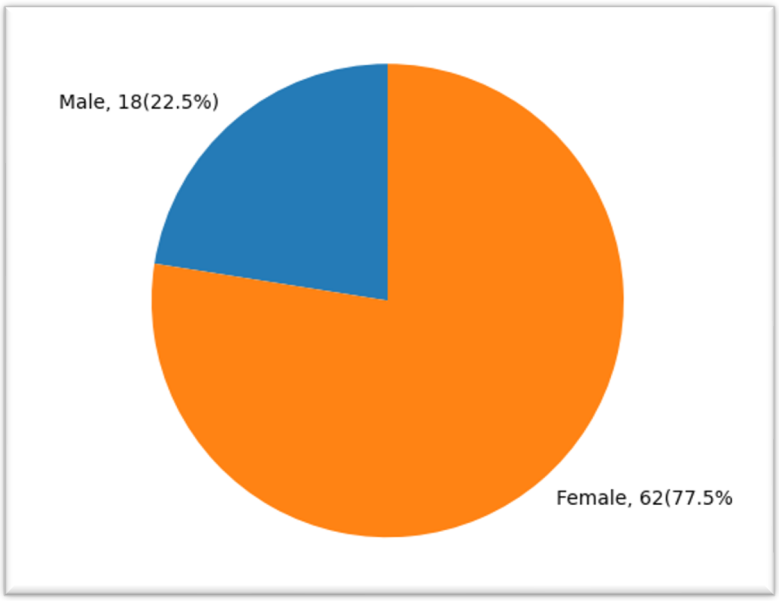

Figure 2: Gender distribution of the study participants

Table 2: Age at Diagnosis of Systemic Lupus Erythematosus

Variable	Value
Age at diagnosis (years), Mean ± SD	10.5 ± 2.4

Table 3: Mean duration of illness of the study participants

Variable	Value
Duration of illness (months), Mean ± SD	5.0 ± 2.2

The length of sickness at presentation for each study participant is displayed in Table 4. The disease lasted 5.0 ± 2.2 months on average.

Table 4: Clinical Characteristics of Paediatric SLE Patients at Presentation (n = 80)

Clinical Feature	n	%
Fever	56	70.0
Skin rash	60	75.0
Joint pain / arthritis	50	62.5
Oral ulcers	36	45.0
Fatigue	46	57.5
Edema	30	37.5
Neurological symptoms (seizure/headache/altered sensorium)	12	15.0
Other symptoms	8	10.0

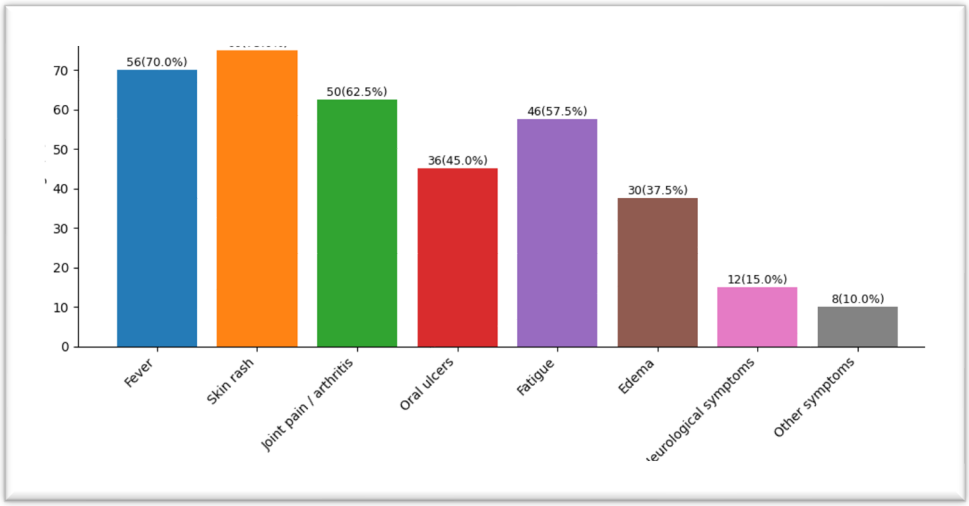

Figure 3: Clinical Characteristics of Paediatric SLE Patients at Presentation (n = 80)

2. **Prevalence and Pattern of Cutaneous Manifestations**

Table 5: Prevalence of Cutaneous Manifestations in Pediatric SLE (n = 80)

Variable	n	%
Presence of ≥1 cutaneous manifestation	66	82.5
Absence of cutaneous manifestation	14	17.5
Single cutaneous manifestation (among total n=80)	28	35.0
Multiple cutaneous manifestations (among total n=80)	38	47.5

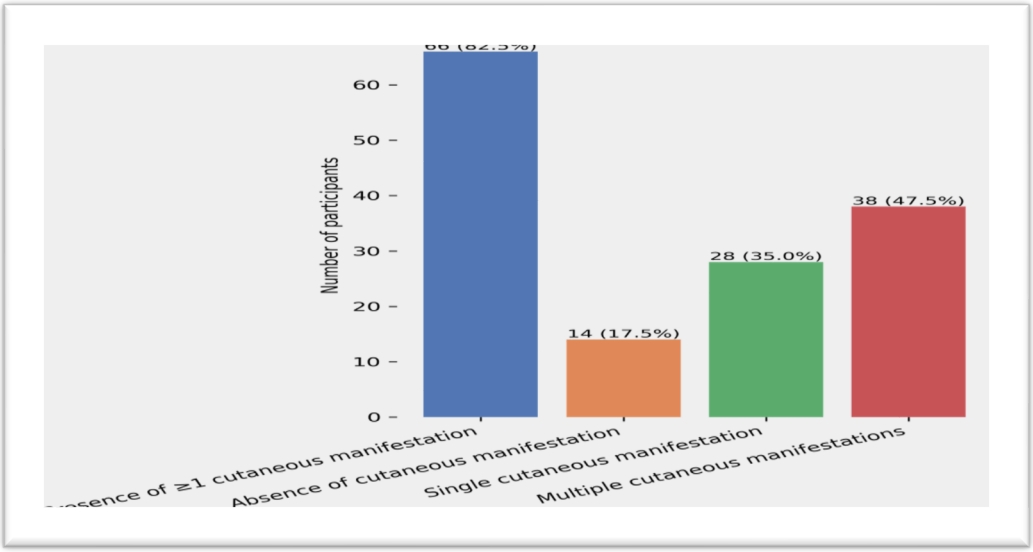

Figure 4: Prevalence of Cutaneous Manifestations in Pediatric SLE (n = 80)

Table 6: Distribution of Specific Cutaneous Manifestations (n = 66)

Cutaneous Manifestation	n	%
Malar rash	44	66.7
Photosensitivity	38	57.6
Oral ulcers	36	54.5
Alopecia	30	45.5
Discoid rash	14	21.2
Vasculitic lesions (palpable purpura/urticarial vasculitis)	12	18.2
Bullous lesions	4	6.1
Nonspecific rash	18	27.3

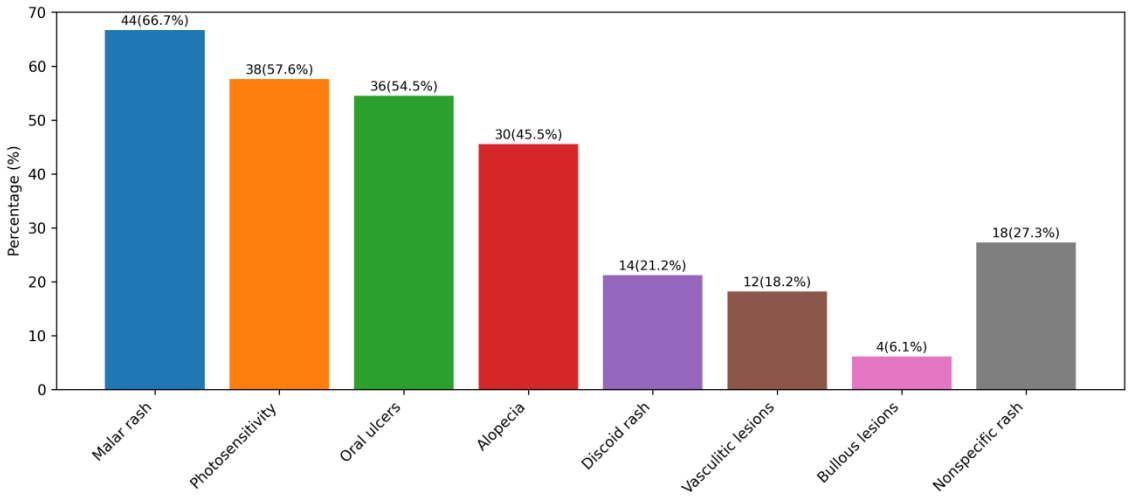

Figure 5: Distribution of Specific Cutaneous Manifestations (n = 66)

Table 7: Classification of Cutaneous Lupus Erythematosus Lesions (n = 66)

CLE Subtype	n	%
Acute cutaneous lupus erythematosus (ACLE)	42	63.6
Subacute cutaneous lupus erythematosus (SCLE)	14	21.2
Chronic cutaneous lupus erythematosus (CCLE)	10	15.2

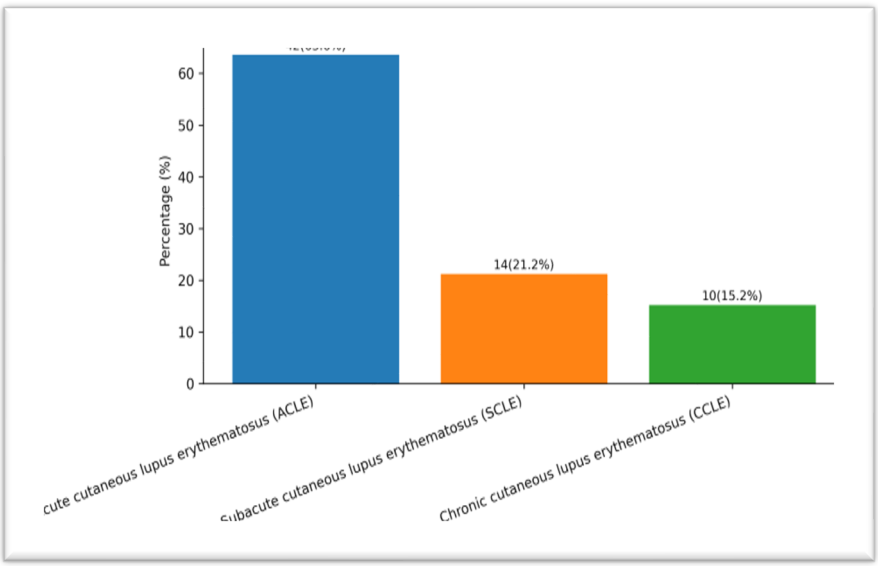

Figure 6: Classification of Cutaneous Lupus Erythematosus Lesions (n = 66)

3. **Clinical Spectrum of Cutaneous Manifestations**

Table 8: Morphological Characteristics of Cutaneous Lesions (n = 66)

Feature	n	%
Maculopapular lesions	40	60.6
Plaque lesions	20	30.3
Ulcerative lesions	8	12.1
Bullous lesions	4	6.1
Vasculitic lesions	12	18.2
Scarring	12	18.2
Dyspigmentation	22	33.3

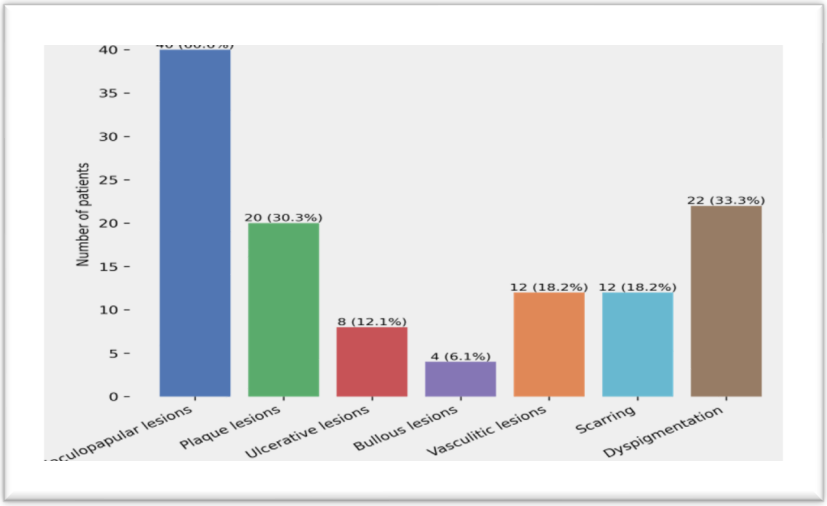

Figure 7: Morphological Characteristics of Cutaneous Lesions (n = 66)

Table 9: Anatomical Distribution of Cutaneous Lesions (n = 66)

Site	n	%
Face	50	75.8
Scalp	28	42.4
Upper limbs	34	51.5
Lower limbs	24	36.4
Trunk	26	39.4
Photo-exposed areas	48	72.7
Generalized involvement	18	s27.3

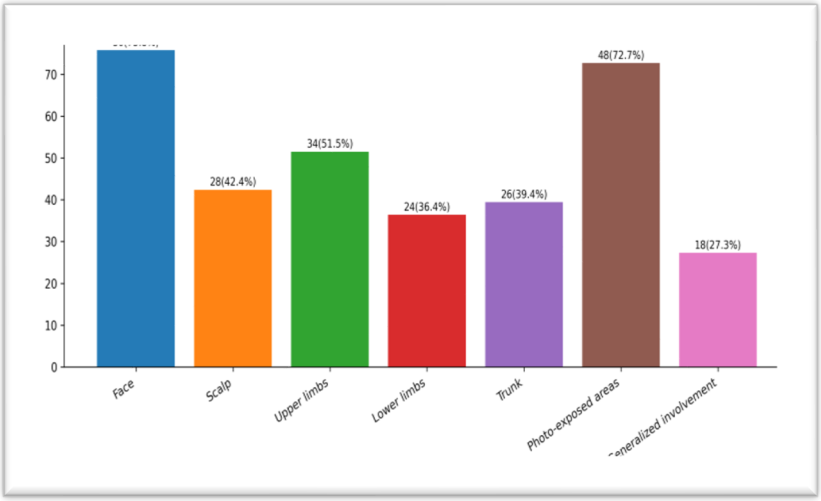

Figure 8: Anatomical Distribution of Cutaneous Lesions (n = 66)

Table 10: Temporal Relationship of Skin Lesions with Disease Course (n = 66)

Timing	n	%
First manifestation of disease	28	42.4
Concurrent with systemic symptoms	26	39.4
During disease flare	22	33.3
During follow-up	14	21.2

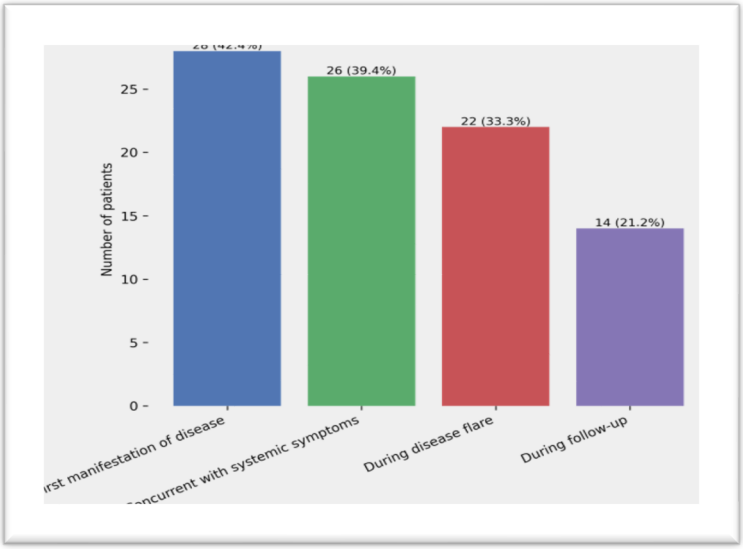

Figure 9: Temporal Relationship of Skin Lesions with Disease Course (n = 66)

Table 11: Laboratory Profile of Pediatric SLE Patients with Cutaneous Manifestations (n = 66)

Laboratory Parameter	n	%
ANA positivity	64	97.0
Anti-dsDNA positivity	48	72.7
Low complement levels (C3 and/or C4)	42	63.6
Anemia	38	57.6
Leukopenia	26	39.4
Thrombocytopenia	20	30.3
Elevated ESR and/or CRP	56	84.8

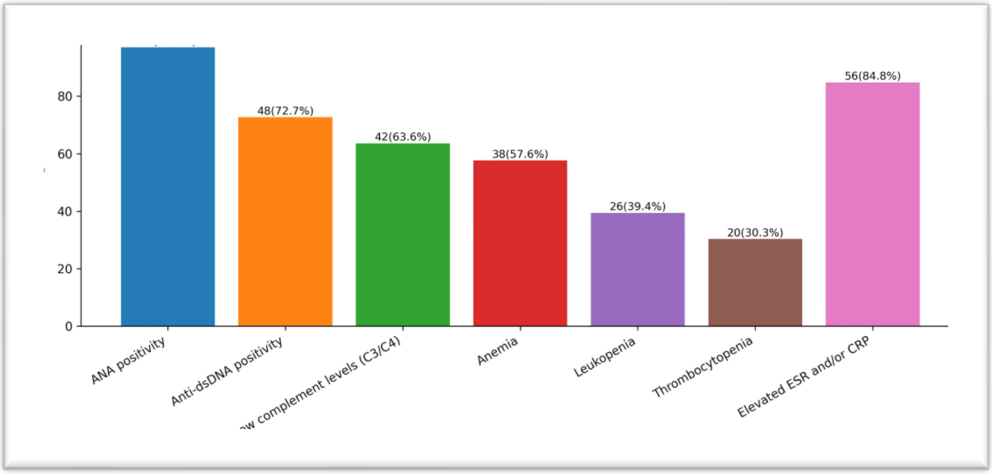

Figure 10: Laboratory Profile of Pediatric SLE Patients with Cutaneous Manifestations (n = 66)

4. **Correlation Between Cutaneous Manifestations and Systemic Involvement**

Table 12: Pattern of Systemic Organ Involvement in Pediatric SLE (n = 80)

System involved	n	%
Musculoskeletal involvement	52	65.0
Renal involvement	46	57.5
Hematological involvement	42	52.5
Neurological involvement	12	15.0
Cardiopulmonary involvement	14	17.5
Gastrointestinal involvement	10	12.5

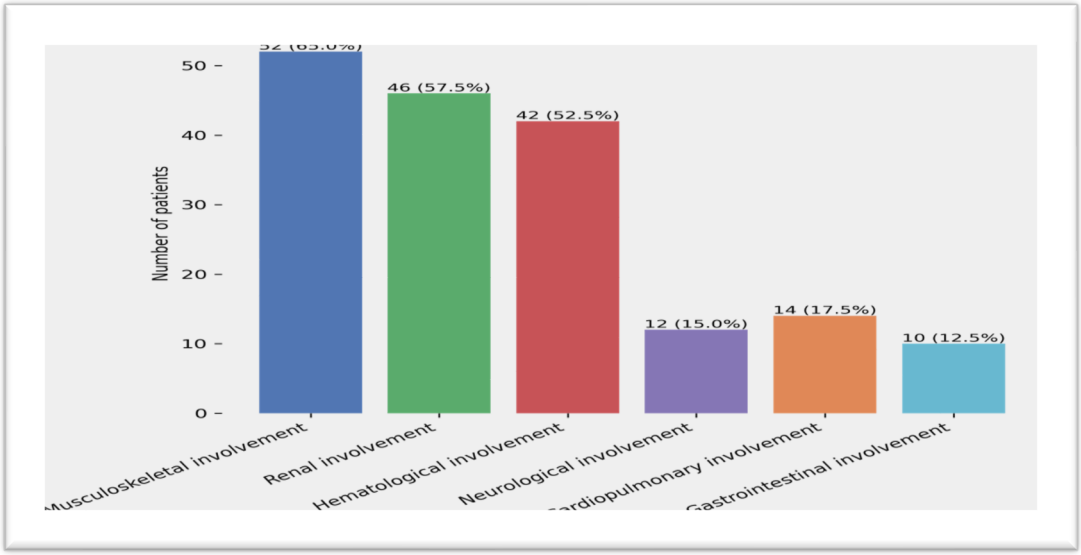

Figure 11: Pattern of Systemic Organ Involvement in Pediatric SLE (n = 80)

Table 13: Association Between Selected Cutaneous Manifestations and Systemic Involvement

Cutaneous manifestation	Renal n (%)	Hematological n (%)	Neurological n (%)	p-value*
Malar rash (n = 44)	30 (68.2)	26 (59.1)	8 (18.2)	0.03
Discoid rash (n = 14)	4 (28.6)	3 (21.4)	0 (0.0)	0.15
Vasculitic lesions (n = 12)	10 (83.3)	9 (75.0)	5 (41.7)	0.01
Alopecia (n = 30)	20 (66.7)	19 (63.3)	6 (20.0)	0.04

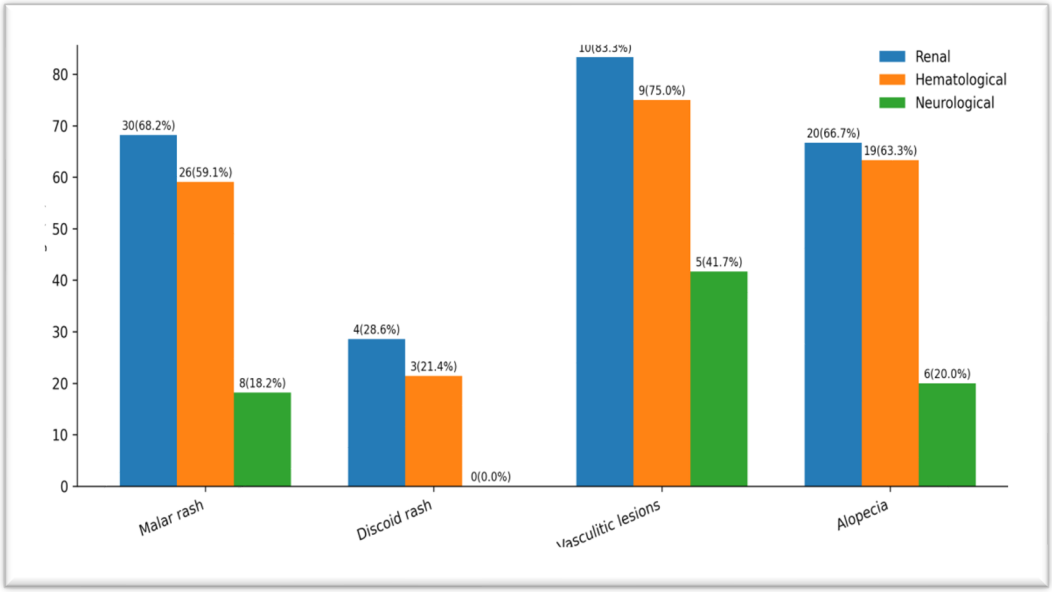

Figure 12: Association Between Selected Cutaneous Manifestations and Systemic Involvement

Table 14: Statistical Summary of Cutaneous–Systemic Correlation

Cutaneous lesion	Test applied	p-value	Interpretation
Malar rash vs renal involvement	Chi-square	0.03	Significant
Discoid rash vs renal involvement	Fisher's exact	0.15	Not significant
Vasculitic lesions vs systemic involvement (renal/hemat/neuro)	Fisher's exact	0.01	Significant
Alopecia vs hematological involvement	Chi-square	0.04	Significant

5. **Clinical Outcome of Cutaneous Manifestations on Follow-up**

Table 15: Follow-up Characteristics for Cutaneous Outcome Assessment

Variable	Value
Patients with cutaneous manifestations (baseline), n	66
Patients assessed on follow-up for cutaneous outcome, n	60
Mean follow-up duration (months), Mean ± SD	10.2 ± 3.6
Lost to follow-up for cutaneous outcome, n (%) (of 66)	6 (9.1)

Table 16: Outcome of Cutaneous Manifestations on Follow-up (n = 60)

Outcome at last follow-up	n	%
Complete resolution	30	50.0
Partial improvement	15	25.0
Persistence	10	16.7
Recurrence	5	8.3
Scarring and/or dyspigmentation**	12	20.0

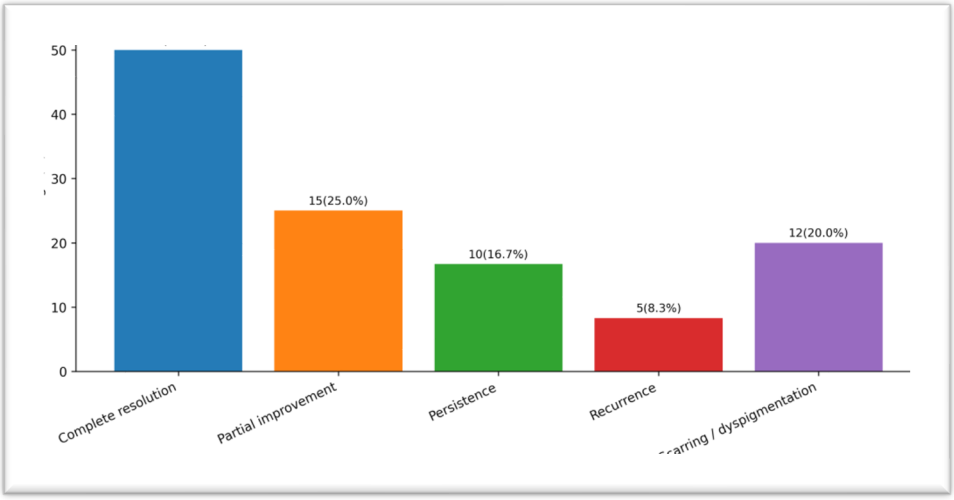

Figure 13: Outcome of Cutaneous Manifestations on Follow-up (n = 60)

Table 17: Treatment Modalities and Cutaneous Outcomes (n = 60)

Treatment modality	n	%	Complete resolution n (%)	Partial improvement n (%)	Persistence/ Recurrence n (%)
Topical therapy only	12	20.0	3 (33.3)	6 (50.0)	2 (16.7)
Systemic therapy only	16	26.7	6 (37.5)	5 (31.3)	5 (31.3)
Combination therapy (topical + systemic)	32	53.3	20 (62.5)	4 (12.5)	8 (25.0)
Total	**60**	**100**	**30**	**15**	**15**

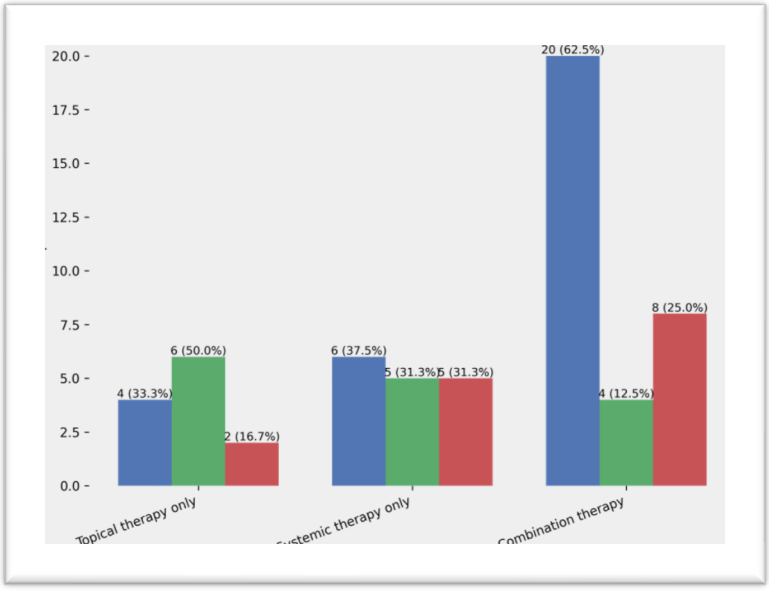

Figure 14: Treatment Modalities and Cutaneous Outcomes (n = 60)

6. **Summary of Key Results**

Table 18: Summary of Major Findings Related to Cutaneous Manifestations

Parameter	Finding
Prevalence of ≥1 cutaneous manifestation	82.5% (66/80)
Most common cutaneous lesion	Malar rash (66.7% of cutaneous patients)
Dominant CLE subtype	ACLE (63.6%)
Most frequent systemic involvement	Musculoskeletal (65.0%), Renal (57.5%)
Cutaneous resolution on follow-up	50.0% complete resolution (30/60 assessed)
Lesion type with strongest systemic association (hypothetical pattern)	Vasculitic lesions (p = 0.01)

Discussion

The high frequency and clinical significance of cutaneous manifestations in pediatric systemic lupus erythematosus (pSLE) are highlighted in this hospital-based observational study, which also emphasizes the significance of these manifestations for diagnosis, prognosis, and treatment. 82.5% of patients had cutaneous involvement, which is in line with rates in juvenile cohorts that have previously been reported to range from 60 to 85% [10,11]. The most common symptoms were alopecia, photosensitivity, mouth ulcers, and malar rash, which is consistent with research from India and other countries [12,13].

Acute cutaneous lupus erythematosus (ACLE) was the predominant subtype (63.6%), followed by subacute and chronic forms. This pattern aligns with earlier observations that ACLE is more common in children and often reflects heightened systemic disease activity [14]. Lesions predominantly affected photo-exposed sites, particularly the face, upper limbs, and scalp, reinforcing the photosensitive nature of lupus-related skin involvement [15–17].

Notably, cutaneous lesions preceded systemic manifestations in over 40% of patients, underscoring their value as early clinical indicators of pSLE. Similar observations have been reported, particularly in relation to subsequent renal and hematological involvement [18,19]. Furthermore, one-third of lesions appeared during disease flares, supporting the concept that cutaneous activity often parallels systemic disease exacerbation [20].

A key finding of this study was the significant association between specific skin lesions and systemic organ involvement. Malar rash was significantly associated with renal and hematological disease, while vasculitic lesions correlated with multisystem involvement, including neurological manifestations. Alopecia was also linked to hematological abnormalities. These associations have been described previously, with vasculitic and alopecic lesions recognized as markers of severe systemic disease [12,21]. Shared immunopathogenic mechanisms, including interferon-mediated pathways in skin and renal tissue, may underlie these correlations [22].

In contrast, discoid lesions did not demonstrate a significant association with systemic involvement,

supporting existing evidence that chronic cutaneous lupus erythematosus (CCLE) often follows a more localized disease course [23,24]. Serological abnormalities, including ANA positivity, elevated anti-dsDNA antibodies, and hypocomplementemia, were common among patients with cutaneous involvement and are well-established markers of disease activity in SLE [20,25].

Therapeutic outcomes were favorable in most patients, with 50% of patients achieving complete resolution of skin lesions. Combined topical and systemic therapy was associated with superior outcomes compared to monotherapy, consistent with recommendations favoring multimodal treatment approaches for lupus-related skin disease [26]. However, persistent or recurrent lesions in a subset of patients highlight the need for early intervention and consideration of targeted biologic therapies, which have shown promising results in refractory pediatric mucocutaneous lupus [27–29].

Overall, this investigation confirms that cutaneous symptoms in pSLE are significant medical signs of systemic illness rather than only being aesthetic. Particularly in environments with limited resources, early detection of skin lesions should motivate thorough serological and systemic investigation. In pediatric practice, the use of standardized cutaneous severity indices, such as the CLASI, may improve prognostication and disease monitoring [30, 31].

Conclusion

The significant frequency and diagnostic utility of cutaneous symptoms in children systemic lupus erythematosus are highlighted in this study. The most common manifestations were malar rash, photosensitivity, mouth ulcers, and baldness; the most common subtype was acute cutaneous lupus erythematosus. Significant correlations were found between certain skin findings, including vasculitic lesions and malar rash, and systemic involvement, including hematological and renal abnormalities. Although some patients had recurring or persistent skin disease, combined topical and systemic therapy showed better results in lesion clearance.These results highlight how crucial early dermatologic evaluation is for prompt identification, risk assessment, and better clinical care in children with SLE. A crucial non-invasive strategy for directing timely and focused management is the recognition of cutaneous symptoms as indicators of systemic disease.

Limitations

This single-center study from a tertiary care hospital in Eastern India included a relatively small sample of 80 children, which may limit statistical power and the detection of less common cutaneous or systemic manifestations. The hospital-based cohort restricts the generalization of findings to broader pediatric populations across different geographic, ethnic, and socioeconomic settings. Additionally, the absence of a standardized cutaneous severity scoring system, such as CLASI, limits the objectivity, reproducibility, and correlation of cutaneous findings with systemic disease activity.

Recommendations

Cutaneous manifestations often precede systemic involvement in pediatric SLE; therefore, thorough dermatological examination should be done as a part of the initial evaluation of children with suspected autoimmune disease. Early findings like malar rash, alopecia, and vasculitic lesions should trigger prompt serologic testing and systemic assessment. Incorporation of standardized cutaneous activity measures, including the CLASI, can enhance objective monitoring and improve correlation with disease activity and therapeutic response. Strengthening multidisciplinary care models involving pediatricians, dermatologists, and rheumatologists is essential, particularly in resource-limited settings, where policy efforts should focus on manpower training and access to immunologic diagnostics. Future multicenter longitudinal studies are needed to clarify skin–systemic disease relationships and to identify early biomarkers that may enable personalized treatment strategies and reduce long-term organ damage and improve disease outcome.

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