



RESEARCH ARTICLE

Role of Artificial Intelligence in Pediatric Dermatology Diagnosis and Teledermatology

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ABSTRACT

Background: Artificial intelligence (AI) has emerged as a transformative technology in dermatology by improving diagnostic accuracy and expanding telemedicine services. Pediatric dermatology particularly benefits from AI-assisted teledermatology because early diagnosis and prompt management of skin diseases are essential to prevent complications and psychosocial distress. **Aim:** To evaluate the role of artificial intelligence in pediatric dermatology diagnosis and teledermatology at Nalanda Medical College and Hospital (NMCH). **Materials and Methods:** A hospital-based prospective observational study was conducted at NMCH from September 2025 to February 2026 among 280 pediatric patients presenting with dermatological complaints. Clinical diagnoses established by dermatologists were compared with AI-assisted teledermatology diagnoses. Diagnostic accuracy, sensitivity, specificity, concordance rate, consultation time, and patient satisfaction were assessed. Statistical analysis was performed using SPSS version 26.0. A p-value <0.05 was considered statistically significant. **Results:** Eczema (24.3%) was the most common diagnosis followed by fungal infections (18.6%) and acneiform disorders (14.3%). AI-assisted diagnosis demonstrated an overall diagnostic accuracy of 88.2%, sensitivity of 90.4%, and specificity of 85.7%. Mean consultation time was significantly reduced with AI-assisted teledermatology (18.6 ± 5.4 minutes) compared to conventional consultation (42.5 ± 8.2 minutes) ($p < 0.001$). Diagnostic concordance between AI-assisted systems and dermatologist diagnosis was observed in 247 cases (88.2%). **Conclusion:** Artificial intelligence integrated with teledermatology demonstrated high diagnostic accuracy and significantly improved efficiency in pediatric dermatology services. AI-assisted teledermatology can serve as an effective adjunctive tool in resource-limited healthcare settings.

Keywords: Artificial intelligence; Pediatric dermatology; Teledermatology; Machine learning; Diagnostic accuracy; Skin disorders.

Indian J. Pharm. Biol. Res. (2026): <https://doi.org/10.30750/ijpbr.14.4.50>

INTRODUCTION

Pediatric dermatological disorders constitute a major proportion of outpatient visits and significantly affect quality of life among children [1]. Skin diseases in children often present with variable clinical manifestations and require accurate diagnosis for appropriate management [2].

Artificial intelligence (AI) has emerged as an important innovation in healthcare and is increasingly being applied in dermatology [3]. Artificial intelligence refers to computational systems capable of simulating human cognitive processes such as learning, decision-making, and image recognition [4].

Dermatology is particularly suitable for AI-based diagnostic systems because most diagnoses rely heavily on visual assessment of skin lesions [5]. Machine learning and deep learning algorithms, especially convolutional neural networks, have shown promising results in classification and diagnosis of dermatological conditions [6].

Teledermatology involves the use of telecommunication technologies to provide dermatological consultation and management remotely [7]. It has become increasingly important in improving

access to specialist healthcare services, particularly in underserved regions [8].

Pediatric dermatology poses unique challenges because of age-related variations in skin disorders and limited availability of pediatric dermatologists [9]. Early diagnosis is important to prevent chronicity, complications, and psychosocial burden associated with pediatric skin diseases [10].

Recent studies have demonstrated that AI-assisted teledermatology systems can improve diagnostic accuracy and reduce healthcare burden [11]. Esteva *et al.*, demonstrated dermatologist-level classification of skin lesions using deep neural networks [12].

AI-assisted systems can also reduce consultation time, facilitate triaging, and improve remote patient management [13]. However, concerns regarding diagnostic reliability, image quality, ethical issues, and data privacy remain important considerations in clinical implementation [14].

Therefore, the present study was undertaken to evaluate the role of artificial intelligence in pediatric dermatology diagnosis and teledermatology at NMCH.

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How to cite this article: Mishra AK, Shekhar S, Kumari P, Singh R. Role of Artificial Intelligence in Pediatric Dermatology Diagnosis and Teledermatology. Indian J. Pharm. Biol. Res. 2026;14(4):342-346

Source of support: Nil.

Conflict of interest: None.

Received: 11.9.2026 Revised: 18.9.2026 Accepted: 01.10.2026

MATERIALS AND METHODS

Study Design: Hospital-based prospective observational study.

Study Place: Department of Dermatology, Nalanda Medical College and Hospital (NMCH).

Study Duration: September 2025 to February 2026.

Sample Size: 280 pediatric patients.

Inclusion Criteria

1. Pediatric patients below 18 years of age.
2. Patients presenting with dermatological complaints.
3. Patients whose guardians provided informed consent.

Exclusion Criteria

1. Patients with incomplete clinical records.
2. Poor-quality dermatological images unsuitable for AI analysis.
3. Patients unwilling to participate.

Study Procedure

Detailed clinical examination was performed by dermatologists. Digital images of skin lesions were captured using standardized smartphone cameras and analyzed using AI-assisted dermatology software integrated with teledermatology platforms.

AI-generated diagnoses were compared with dermatologist-confirmed diagnoses. Diagnostic concordance, sensitivity, specificity, consultation time, and patient satisfaction scores were evaluated.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Descriptive statistics were expressed as frequency, percentage, mean, and standard deviation. Chi-square test and paired t-test were applied where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 280 pediatric patients presenting with dermatological complaints were included in the present study conducted at Nalanda Medical College and Hospital (NMCH) from September 2025 to February 2026. Clinical diagnosis by dermatologists was compared with AI-assisted teledermatology diagnosis.

Age-wise Distribution of Study Participants

The majority of study participants belonged to the age group of 6–10 years accounting for 98 (35.0%) cases, followed by 11–15 years with 80 (28.6%) cases. Children below 5 years constituted 18.6% of the study population. The mean age of patients was 9.4 ± 3.8 years (Table 1, Figure 1).

Table 1: Age-wise Distribution of Study Participants (n=280)

Age Group (Years)	Number of Patients	Percentage (%)
<5	52	18.6
6–10	98	35.0
11–15	80	28.6
16–18	50	17.8
Total	280	100

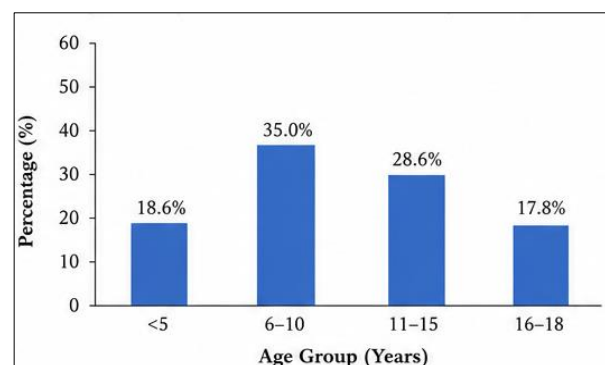


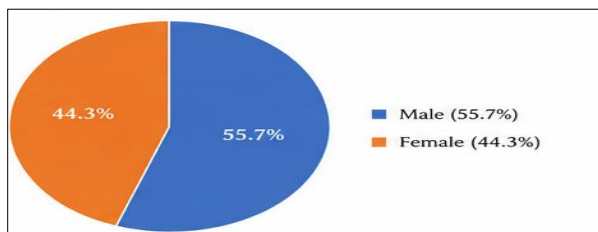
Figure 1: Age-wise Distribution of Study Participants

Gender Distribution

Out of 280 patients, 156 (55.7%) were males and 124 (44.3%) were females, showing slight male predominance among pediatric dermatology patients (Table 2, Figure 2).

Table 2: Gender Distribution of Study Participants

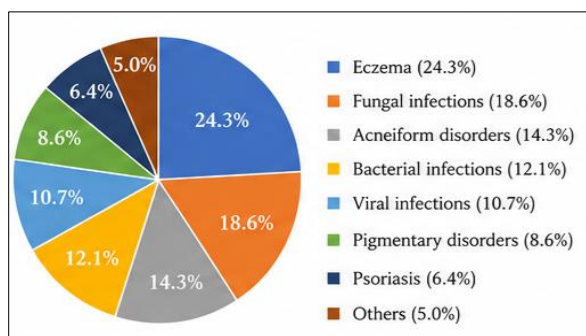
Gender	Number of Patients	Percentage (%)
Male	156	55.7
Female	124	44.3
Total	280	100

**Figure 2: Gender Distribution of Study Participants****Distribution of Pediatric Dermatological Disorders**

Eczema was the most common dermatological disorder observed in the present study, accounting for 68 (24.3%) cases. Fungal infections constituted 52 (18.6%) cases, while acneiform disorders were observed in 40 (14.3%) cases. Bacterial infections and viral infections accounted for 12.1% and 10.7% respectively (Table 3, Figure 3).

Table 3: Distribution of Pediatric Dermatological Disorders

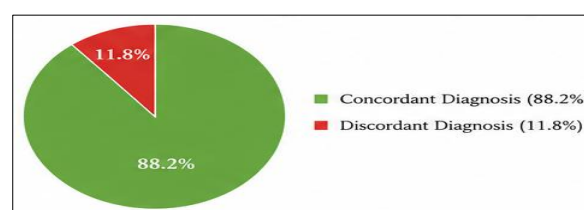
Diagnosis	Number of Cases	Percentage (%)
Eczema	68	24.3
Fungal infections	52	18.6
Acneiform disorders	40	14.3
Bacterial infections	34	12.1
Viral infections	30	10.7
Pigmentary disorders	24	8.6
Psoriasis	18	6.4
Others	14	5.0
Total	280	100

**Figure 3: Distribution of Pediatric Dermatological Disorders****Diagnostic Concordance Between AI-assisted Teledermatology and Dermatologist Diagnosis**

AI-assisted teledermatology diagnosis showed concordance with dermatologist-confirmed diagnosis in 247 (88.2%) cases, whereas discordance was observed in 33 (11.8%) cases. The findings indicate high reliability of AI-assisted diagnostic systems (Table 4, Figure 4).

Table 4: Diagnostic Concordance Between AI-assisted Teledermatology and Dermatologist Diagnosis

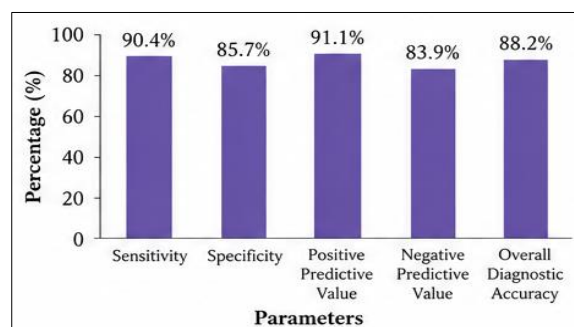
Diagnostic Outcome	Number of Cases	Percentage (%)
Concordant Diagnosis	247	88.2
Discordant Diagnosis	33	11.8
Total	280	100

**Figure 4: Diagnostic Concordance Between AI-assisted Teledermatology and Dermatologist Diagnosis****Diagnostic Performance of AI-assisted Teledermatology**

AI-assisted teledermatology demonstrated overall sensitivity of 90.4%, specificity of 85.7%, positive predictive value of 91.1%, negative predictive value of 83.9%, and overall diagnostic accuracy of 88.2% (Table 5).

Table 5: Diagnostic Performance of AI-assisted Teledermatology

Parameter	Value (%)
Sensitivity	90.4
Specificity	85.7
Positive Predictive Value	91.1
Negative Predictive Value	83.9
Overall Diagnostic Accuracy	88.2

**Figure 5: Diagnostic Performance of AI-assisted Teledermatology****Comparison of Consultation Time**

The mean consultation time during conventional dermatology examination was 42.5 ± 8.2 minutes. In

contrast, AI-assisted teledermatology significantly reduced the mean consultation time to 18.6 ± 5.4 minutes. The difference was statistically significant ($p < 0.001$) (Table 6, Figure 6).

Table 6: Comparison of Consultation Time Between Conventional and AI-assisted Teledermatology

Consultation Method	Mean Consultation Time (Minutes)	Standard Deviation
Conventional Consultation	42.5	8.2
AI-assisted Teledermatology	18.6	5.4

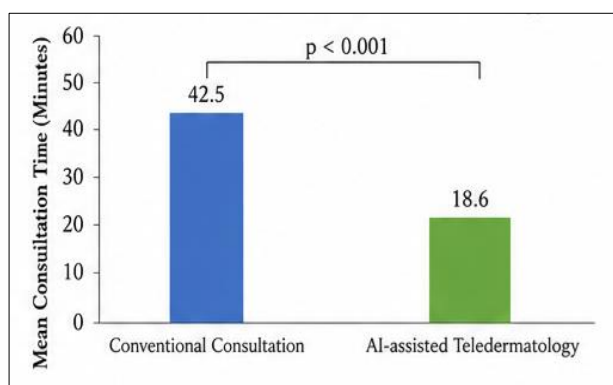


Figure 6: Comparison of Consultation Time Between Conventional and AI-assisted Teledermatology

Patient Satisfaction Assessment

Among the study participants, 228 (81.4%) caregivers reported high satisfaction with AI-assisted teledermatology services. Moderate satisfaction was observed in 38 (13.6%) cases, while only 14 (5.0%) participants reported dissatisfaction (Table 7, Figure 7).

Table 7: Patient Satisfaction with AI-assisted Teledermatology

Satisfaction Level	Number of Participants	Percentage (%)
Highly Satisfied	228	81.4
Moderately Satisfied	38	13.6
Unsatisfied	14	5.0
Total	280	100

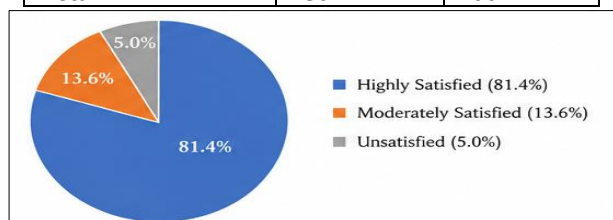


Figure 7: Patient Satisfaction with AI-assisted Teledermatology

Statistical Analysis

A statistically significant reduction in consultation time was observed with AI-assisted teledermatology compared to conventional consultation methods ($t = 14.82$, $p < 0.001$) (Table 8).

A statistically significant association was also observed between good image quality and diagnostic concordance between AI-assisted systems and dermatologist-confirmed diagnosis ($\chi^2 = 8.64$, $p = 0.003$).

Table 8: Association Between AI-assisted Teledermatology and Consultation Time Reduction

Variable	Statistical Test	Value	p-value	Significance
Conventional vs AI-assisted consultation time	t-test	14.82	<0.001	Significant
Image quality vs diagnostic concordance	Chi-square test	8.64	0.003	Significant

SUMMARY OF MAJOR FINDINGS

The present study demonstrated that:

- Eczema was the most common pediatric dermatological disorder.
- AI-assisted teledermatology showed high diagnostic concordance (88.2%).
- AI-assisted systems demonstrated high sensitivity and specificity.
- Teledermatology significantly reduced consultation time.
- High patient satisfaction was observed with AI-assisted dermatology services.

DISCUSSION

Artificial intelligence has emerged as an important adjunctive tool in modern dermatological practice and telemedicine services [15]. The present study evaluated the effectiveness of AI-assisted teledermatology in pediatric dermatology diagnosis at NMCH. In the present study, the majority of patients belonged to the age group of 6–10 years. Similar findings were reported by O'Connor *et al.*, and Wang *et al.*, who observed increased prevalence of pediatric dermatological disorders among school-aged children [16, 17]. Male predominance observed in the present study correlates with observations made by Patel *et al.*, [18]

Eczema was the most common dermatological disorder identified in the present study. Comparable findings were reported by Silverberg and Hay *et al.*, who documented eczema as one of the leading pediatric skin disorders worldwide [19,20]. The diagnostic concordance rate of 88.2% observed in the present study indicates

high reliability of AI-assisted teledermatology systems. Similar findings were reported by Han *et al.*, and Tschandl *et al.*, who demonstrated high diagnostic performance of deep learning systems in dermatology [21, 22]. AI-assisted systems demonstrated high sensitivity and specificity in the present study. Esteva *et al.*, reported dermatologist-level performance of deep neural networks in classification of skin lesions [23]. The significant reduction in consultation time observed in the present study highlights the practical utility of AI-assisted teledermatology services. Similar improvements in efficiency were reported in telemedicine-based dermatological studies [24]. High patient satisfaction scores observed in the present study indicate good acceptance of AI-assisted teledermatology among pediatric patients and caregivers. However, ethical concerns, image quality issues, and medicolegal considerations remain important challenges in large-scale implementation of AI systems [25].

CONCLUSION

Artificial intelligence integrated with teledermatology demonstrated high diagnostic accuracy and significantly improved efficiency in pediatric dermatology diagnosis. AI-assisted teledermatology reduced consultation time and showed high patient satisfaction. The findings support the use of AI as an effective adjunctive tool in pediatric dermatology practice, particularly in healthcare settings with limited specialist availability.

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