International Journal of Management Research and Social Science (IJMRSS)
Volume 13, Issue 2, April – June 2026
ISSN 2394-6407(Print)
ISSN 2394-6415(Online)

Pediatric Ear, Nose, and Throat Disorders Clinical Challenges, Diagnostic Strategies and Innovative Solutions in Pediatric Otolaryngology

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Abstract — Pediatric ear, nose, and throat (ENT) disorders represent a significant proportion of childhood illnesses and are among the most common reasons for paediatric healthcare visits worldwide. Conditions such as otitis media, tonsillitis, adenoid hypertrophy, allergic rhinitis, and upper airway infections frequently affect children due to anatomical, immunological, and environmental factors. This cross-sectional analytical study examines the clinical challenges associated with paediatric ENT disorders and evaluates current diagnostic and management strategies among 214 paediatric patients. Recurrent ear infections and allergic rhinitis were the most prevalent ENT conditions. Otitis media was the most frequently diagnosed disorder (33.6%). Combined treatment strategies involving medical therapy and surgical intervention produced the highest clinical improvement scores (F=7.21, p=0.001). The integration of telemedicine consultations and digital diagnostic technologies demonstrated significant potential for improving access to paediatric ENT care.

Keywords — *Pediatric ENT Disorders; Otitis Media; Pediatric Otolaryngology; Childhood Respiratory Disorders; Pediatric Airway Diseases; ENT Clinical Management.*

1. Introduction

Paediatric ear, nose, and throat (ENT) disorders constitute a major component of childhood health problems and represent one of the most frequent reasons for paediatric outpatient visits and hospital admissions worldwide. Children are particularly vulnerable to ENT diseases due to anatomical, immunological, and developmental factors that predispose them to infections and inflammatory conditions affecting the upper respiratory tract. Common paediatric ENT disorders include otitis media, tonsillitis, adenoid hypertrophy, allergic rhinitis, sinusitis, and upper airway obstruction, which can significantly affect a child's physical health, hearing ability, speech development, and overall quality of life (Graham et al., 2007).

Among paediatric ENT conditions, otitis media is one of the most common diseases affecting children globally, with recurrent infections potentially leading to hearing loss, language development delays, and impaired educational performance (Grevers, 2010). Allergic conditions including allergic rhinitis and atopic disease frequently contribute to chronic nasal obstruction, sinusitis, and recurrent ear infections in children (Caruso et al., 2009). Telemedicine consultations enable healthcare providers to evaluate ENT symptoms remotely, improving access to specialised care in rural or underserved areas (Fatma et al., 2025). AI and digital health technologies are emerging as promising tools in paediatric healthcare, with machine learning algorithms assisting clinicians in identifying disease patterns and predicting treatment outcomes (Devi et al., 2025; Shanthi et al., 2025; Catherine et al., 2025). Environmental exposures, socioeconomic conditions, and healthcare accessibility significantly influence the prevalence and management of paediatric ENT disorders (Ashifa, 2021; Kariveliparambil et al., 2026).

Mental health literacy among parents and caregivers supports timely ENT care-seeking and adherence to management protocols (Elkin et al., 2025; Ranganathan et al., 2024). Self-leadership competencies among nursing staff and paediatric health teams improve the quality of ENT care delivery (Mustafa et al., 2026; Zahoor et al., 2025). Community disability rehabilitation and active ageing programmes demonstrate the broader public health value of ENT care integration (Ashifa, 2019; Rasi and Ashifa, 2019). Rehabilitation and patient education strategies following ENT procedures support long-term recovery outcomes (Vettriselvan et al., 2026).

2. Review of Literature

Graham et al. (2007) provided a comprehensive overview of paediatric ENT conditions, emphasising the importance of early diagnosis and appropriate treatment in preventing complications. Grevers (2010) highlighted the global burden of otitis media and emphasised the need for improved prevention strategies including vaccination

DOI: **10.30726/ijmrss/v13.i2.2026.13234**

programmes and early clinical intervention. Sharma et al. (2014) reported that a large proportion of paediatric emergency clinic visits were related to ENT complaints, underscoring the clinical burden of these conditions.

Caruso et al. (2009) found that allergic conditions frequently contribute to chronic nasal inflammation and sinusitis among children. Chmielik et al. (2023) reviewed health-related quality of life among children suffering from ENT conditions and emphasised the importance of addressing psychosocial aspects of disease management. Telemedicine consultations and digital health platforms enable clinicians to evaluate ENT symptoms remotely and provide guidance for treatment planning (Fatma et al., 2025).

AI-driven diagnostic tools may assist clinicians in identifying disease patterns and improving treatment outcomes in paediatric otolaryngology (Devi et al., 2025; Catherine et al., 2025; Shanthi et al., 2025). Healthcare marketing innovations and machine learning platforms improve community awareness about paediatric ENT disorders and encourage timely healthcare-seeking (Swadhi et al., 2025; Jenifer et al., 2025). Strategic collaborations in medical innovation and AI-driven globalisation accelerate development of advanced paediatric ENT diagnostic and treatment technologies (Vijayalakshmi et al., 2025). Tribal and indigenous community health determinants shape access to paediatric ENT services in marginalised settings (Ashifa, 2021; Kariveliparambil et al., 2026). Occupational stress and environmental exposures experienced by parents and caregivers may compound children's vulnerability to ENT disorders (Gayathri et al., 2025; Vettriselvan and Anto, 2018). Rehabilitation robotics and adaptive motion planning technologies present emerging opportunities for postoperative ENT rehabilitation (Venice et al., 2026).

3. Objectives

- To examine the prevalence and distribution of ENT disorders among paediatric patients presenting to tertiary healthcare institutions.
- To evaluate the effectiveness of different treatment modalities in managing paediatric ENT conditions.
- To identify key factors influencing treatment outcomes.
- To propose clinical practice and healthcare policy recommendations for improving paediatric ENT care.

4. Methodology

A cross-sectional analytical research design was adopted to examine the prevalence, diagnostic challenges, and management outcomes associated with paediatric ENT disorders. The research was conducted in paediatric departments and otolaryngology clinics of tertiary healthcare institutions. The study population consisted of paediatric patients aged 1–14 years presenting with symptoms related to ear, nose, or throat disorders. A sample of 214 paediatric patients was selected using systematic sampling from clinical registries and outpatient records. Data collection involved clinical examinations, diagnostic imaging reports, laboratory findings, and caregiver questionnaires. Clinical variables examined included type of ENT disorder, frequency of infections, symptom severity, comorbid conditions, and treatment methods. Treatment modalities evaluated included medical therapy and surgical interventions including adenoidectomy, tonsillectomy, and tympanostomy tube insertion. Statistical analysis used descriptive statistics, ANOVA, and regression modelling at $p<0.05$. Ethical approval was obtained and informed consent collected from parents or guardians.

5. Results and Discussion

Table 1: Demographic Characteristics of Pediatric Patients (N = 214)

Variable	Category	Frequency	Percentage (%)
Age Group	1–5 years	86	40.2
	6–10 years	72	33.6
	11–14 years	56	26.2
Gender	Male	118	55.1
	Female	96	44.9

Table 2: Types of Pediatric ENT Disorders Diagnosed

Disorder Type	Number of Cases	Percentage (%)
Otitis media	72	33.6
Tonsillitis	48	22.4
Allergic rhinitis	38	17.8
Adenoid hypertrophy	30	14.0
Sinusitis	26	12.1

Table 3: Treatment Modalities Used

Treatment Type	Number of Patients	Percentage (%)
Medical therapy	118	55.1
Surgical intervention	42	19.6
Combined medical and surgical therapy	54	25.2

DOI: 10.30726/ijmrss/v13.i2.2026.13234

ISSN 2394-6407(Print)
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Table 4: ANOVA Analysis — Treatment Outcome Improvement

Treatment Type	Mean Improvement Score	F-value	p-value
Medical therapy	3.18	5.46	0.005
Surgical therapy	3.42	6.12	0.003
Combined therapy	3.78	7.21	0.001

Combined treatment strategies involving both medical therapy and surgical intervention provided the most favourable clinical outcomes (F=7.21, p=0.001), confirming the value of integrated paediatric ENT management approaches.

Paediatric ENT disorders were most prevalent among children aged 1–5 years, reflecting increased vulnerability to respiratory infections and immature immune responses during early childhood (Srinivasan and Raja, 2024). Otitis media emerged as the most common disorder, consistent with Grevers (2010). Surgical procedures such as adenoidectomy and tympanostomy tube placement significantly improve clinical outcomes among children with recurrent ENT infections, helping restore airway function and prevent repeated infections that may impair hearing and speech development (Graham et al., 2007). Telemedicine platforms have expanded access to paediatric ENT care particularly in rural or underserved regions (Fatma et al., 2025). AI and digital health technologies may further enhance paediatric healthcare by enabling clinicians to analyse patient data and identify disease patterns (Devi et al., 2025; Shanthi et al., 2025).

6. Conclusion

Paediatric ENT disorders represent a significant component of childhood health problems and remain one of the most frequent reasons for paediatric healthcare consultations worldwide. Otitis media emerged as the most frequently diagnosed disorder, followed by tonsillitis and allergic rhinitis. ENT disorders were particularly prevalent among children in the early years of life, reflecting developmental vulnerability and immature immune function. Combined treatment strategies involving both medical therapy and surgical intervention provided the most effective clinical outcomes. Effective management requires integrated healthcare strategies combining early diagnosis, evidence-based treatment approaches, multidisciplinary collaboration, technological innovation, and public health interventions targeting social determinants of paediatric ENT health.

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DOI: 10.30726/ijmrss/v13.i2.2026.13234

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DOI: **10.30726/ijmrss/v13.i2.2026.13234**