ISSN 2692-5877
DOI: 10.46998/IJCMCR.2026.61.001516

International Journal of
Clinical Studies & Medical Case Reports

Research Article

Beyond Conductive Hearing Loss: A Multidimensional Profile of Speech and Language Dysfunction in Children with Persistent Otitis Media With Effusion

Fadoua El Mourabit*, Lahjaouj M, Loudghiri M, Bijou W, Oukessou Y, Rouadi S, Abada R, Roubal M and Mahtar M

Department of Otolaryngology–Head and Neck Surgery, Ibn Rochd University Hospital, Faculty of Medicine and Pharmacy, Hassan II University of Casablanca, Casablanca, Morocco

***Corresponding author:** Fadoua El Mourabit, Department of Otolaryngology–Head and Neck Surgery, Ibn Rochd University Hospital, Faculty of Medicine and Pharmacy, Hassan II University of Casablanca, Casablanca, Morocco

Received: August 31, 2026 Published: November 06, 2026

Abstract

Background: Otitis Media with Effusion (OME) is one of the most prevalent childhood middle-ear disorders and a leading cause of acquired conductive hearing impairment. Its influence on speech and language development remains controversial, particularly because effects may vary according to age, duration, bilaterality, auditory deprivation, and the developmental vulnerability of the child.

Objective: To characterize speech and language performance in children with persistent OME and determine the frequency and pattern of language dysfunction in a Moroccan pediatric population.

Methods: This descriptive observational single-center study was conducted in the Department of Otorhinolaryngology at CHU 20 Août, Casablanca, between September 2017 and September 2019. Fifty-two children aged 3–12 years with OME persisting for at least three months were included. Children with other disorders independently capable of causing language impairment were excluded. Fifty children underwent formal speech-language evaluation using a battery adapted to the Moroccan population.

Results: Mean age was 6.8 years and 53.84% were boys. Bilateral OME was present in 84.62%, and 96.15% were diagnosed in the context of hearing impairment. Language delay was reported in 42.31% and school difficulties in 36.58%.
Formal speech-language assessment identified impairment in 68% of evaluated children. Working-memory impairment was present in 44%, rhythm disturbances in 42%, phonological impairment in 36%, auditory discrimination impairment in 26%, reduced intelligibility in 24%, lexical impairment in 20%, morphosyntactic impairment in 18%, and articulation difficulties in 10%.
Language impairment was particularly frequent in younger children: 91.67% of children aged 3–5 years demonstrated impairment compared with 60.53% of those aged 5–12 years.

Conclusion: Persistent OME in this clinically selected cohort was associated with a high burden of multidimensional speech-language dysfunction, particularly among younger children. The predominant involvement of working memory, rhythm, phonological processing, and auditory discrimination suggests that the consequences of fluctuating conductive hearing impairment may extend beyond audibility alone. However, because the study was observational and lacked a control group, causality cannot be inferred. Persistent OME should prompt systematic assessment of hearing and developmental vulnerability, with targeted speech-language evaluation when concerns are identified.

Keywords: Otitis media with effusion; Speech; Language development; Conductive hearing loss; Phonology; Working memory; Children; Tympanostomy tubes

Introduction

Otitis Media with Effusion (OME) is defined by the presence of middle-ear fluid without signs or symptoms of acute middle-ear infection [1,2]. It is among the most frequent disorders of childhood and represents an important cause of transient or fluctuating conductive hearing impairment [1–4].

Its clinical significance extends beyond the middle ear.

Childhood language acquisition depends on continuous access to an intelligible and sufficiently stable acoustic signal. During sensitive developmental periods, fluctuating hearing impairment could theoretically degrade phonological representations, reduce speech-sound discrimination, increase listening effort, and interfere with lexical and morphosyntactic learning.

This biological plausibility has generated longstanding concern that persistent or recurrent OME might contribute to speech, language, behavioral, or academic difficulties [3–7].

However, the literature remains controversial.

A meta-analysis of prospective studies by Roberts et al. found no or only very small average negative associations between early OME and subsequent speech-language development in otherwise healthy children [5]. Randomized trials by Paradise and colleagues further demonstrated that prompt tympanostomy-tube insertion, compared with delayed insertion, did not improve long-term developmental outcomes in otherwise healthy young children with persistent middle-ear effusion [6,7].

These findings are essential because they demonstrate that OME should not automatically be equated with developmental language disorder, nor should tympanostomy tubes be presented as a treatment for language delay itself.

Nevertheless, population-average effects may conceal clinically vulnerable subgroups.

The developmental impact of auditory deprivation may depend on age at exposure, duration and bilaterality of effusion, magnitude and fluctuation of hearing loss, socioeconomic and linguistic environment, baseline developmental reserve, and coexistence of other risk factors [1,3,5,8].

Current clinical guidelines therefore emphasize identification of children at increased risk for speech, language, or learning problems and recommend hearing assessment when OME persists or developmental concerns arise [1,2].

Data from North African and Arabic-speaking pediatric populations remain comparatively limited. Linguistic context may also influence how phonological, lexical, and morphosyntactic vulnerabilities manifest.

The objective of the present study was therefore to characterize oral language performance in Moroccan children with persistent OME using a locally adapted speech-language assessment battery and to determine both the prevalence and the multidimensional profile of observed deficits.

Materials and Methods

Study design and setting:

We conducted a descriptive, observational, monocentric study in the Department of Otorhinolaryngology, CHU 20 Août, Casablanca, Morocco.

Recruitment occurred over two years, from September 2017 to September 2019.

Participants:

A total of 52 children were included.

Inclusion criteria were:

- age between 3 and 12 years;
- diagnosis of OME;
- persistence/follow-up for at least three months;
- parental informed consent.

Children outside the specified age range and children with another condition independently capable of producing language impairment were excluded.

Speech-language evaluation:

Fifty of the 52 included children underwent formal speech-language assessment using a battery adapted to the Moroccan population.

The evaluation explored several dimensions, including:

- auditory discrimination;
- working memory;
- rhythm;
- phonology;
- intelligibility;
- lexical performance;
- morphosyntax;
- articulation.

Clinical variables:

Demographic, socioeconomic, environmental, otological, audiological, and upper-airway characteristics were recorded.

The source dataset was analyzed using Excel.

Because the study was primarily descriptive and the available source does not provide multivariable analyses or adjusted effect estimates, associations reported in the present manuscript should be interpreted as descriptive rather than causal.

Results

Demographic characteristics:

Mean age was 6.8 years.

Boys represented 53.84% of the cohort, corresponding to a sex ratio of 1.16.

Consultations showed an autumn-winter predominance (56%).

A low socioeconomic background was reported in 62.54% of children, while 38.46% were classified as having a middle socioeconomic level.

Characteristics of OME:

Bilateral disease predominated markedly, occurring in 84.62% of children.

Left unilateral disease accounted for 5.77%, and right unilateral disease for 9.62%.

Hearing impairment was the predominant circumstance leading to diagnosis and was reported in 96.15%.

A type-B tympanogram was identified in 76.86%.

Associated clinical factors:

Daycare attendance was reported in 59.62%, allergic background in 30.77%, passive tobacco exposure in 17.31%, and prematurity in 9.62%.

Associated upper-airway findings were frequent:

- adenoid hypertrophy: 80.76%;
- tonsillar hypertrophy: 67.30%;
- chronic nasal obstruction: 61.53%.

Developmental presentation:

Before formal assessment, 42.31% of children had been identified as having language delay.

Citation: Fadoua El Mourabit*, Lahjaouj M, Loudghiri M, Bijou W, Oukessou Y, Rouadi S, Abada R, Roubal M and Mahtar M. Beyond Conductive Hearing Loss: A Multidimensional Profile of Speech and Language Dysfunction in Children with Persistent Otitis Media With Effusion. *IJCMCR. 2026; 61(4): 001*

DOI: 10.46998/IJCMCR.2026.61.001516

School difficulties were reported in 36.58%.

Formal speech-language findings:
Among the 50 formally evaluated children, 68% demonstrated speech-language impairment, whereas 32% had no identified disorder.
The abnormalities were multidimensional.
The most frequent was working-memory impairment (44%), followed by:

- rhythm disturbances: 42%;
- phonological impairment: 36%;
- auditory discrimination impairment: 26%;
- reduced intelligibility: 24%;
- lexical impairment: 20%;
- morphosyntactic impairment: 18%;
- articulation impairment: 10%.

Age and language impairment:
The burden of impairment was greatest among younger children.
Among children aged 3–5 years, 91.67% demonstrated language abnormalities.
Among children aged 5–12 years, 60.53% were affected.
Sex distribution among children with language impairment was equal: 50% boys and 50% girls.
Most children with language impairment had bilateral OME (85.29%).

Treatment and observed language status:
In the historical cohort, children received medical management before surgical consideration.
Tympanostomy tubes alone were placed in 1.92%; tubes plus adenoidectomy in 28.85%; and tubes, adenoidectomy and tonsillectomy in 25%. In 44.23%, tympanostomy-tube placement was planned but had not yet been performed at assessment.

Speech-language impairment was observed in 62.07% of children who had undergone tympanostomy-tube placement compared with 76.19% of those who had not yet undergone the procedure.

Because treatment allocation was not randomized and preoperative and postoperative measurements were not paired, this difference cannot be interpreted as evidence that tympanostomy tubes improved language outcome.
All children identified with language impairment were referred for speech-language therapy.

Discussion

The principal finding of this study is the high prevalence and broad spectrum of speech-language abnormalities among children referred with persistent OME.
Formal assessment identified impairment in 68%, considerably exceeding the 42.31% in whom language delay had already been clinically recognized.
This discrepancy is clinically important.

It suggests that routine history may identify only the most overt developmental difficulties, whereas structured assessment can reveal more subtle deficits affecting working memory, phonological processing, auditory discrimination, rhythm, intelligibility, vocabulary, and morphosyntax.

However, these findings must be interpreted carefully.
The relationship between OME and language development has been debated for decades. Although persistent middle-ear effusion can produce fluctuating conductive hearing loss during periods of rapid language acquisition, longitudinal studies have not consistently demonstrated large or persistent developmental effects in otherwise healthy children [3–7].

The meta-analysis by Roberts et al. is particularly relevant. Across prospective studies, associations between early OME and later receptive language, expressive language, vocabulary, syntax, or speech were generally absent or small. Where differences were identified, effect sizes were modest, and confounding variables such as socioeconomic background remained important [5].

Our study therefore should not be interpreted as demonstrating that OME caused language impairment in 68% of affected children.
Rather, it demonstrates that within a clinically selected population of children with persistent OME, language abnormalities were common and frequently multidimensional.
Several characteristics of our cohort may help explain the high observed prevalence.
First, 84.62% had bilateral disease. Bilateral effusion is more likely than unilateral disease to produce functionally relevant degradation of auditory input.
Second, the cohort was selected for persistent OME of at least three months rather than transient community-detected effusion.
Third, hearing impairment was already clinically evident in 96.15%, indicating that this was not an unselected population of asymptomatic children.
Fourth, a substantial proportion came from lower socioeconomic backgrounds. Language development is strongly influenced by environmental and socioeconomic determinants, which may interact with hearing impairment and therefore represent potential confounders.
The age effect is particularly noteworthy.

Language impairment was identified in 91.67% of children aged 3–5 years, compared with 60.53% among older children. The preschool period represents a phase of intense phonological, lexical, and morphosyntactic development. Degraded auditory access during this period may therefore be particularly relevant in susceptible children.

Nevertheless, the cross-sectional design prevents determination of whether the apparent age gradient represents developmental vulnerability, spontaneous recovery with age, referral patterns, duration of OME, or other unmeasured factors.

An important strength of our study is the characterization of specific domains rather than language delay as a binary endpoint.

Working-memory difficulties were the most frequent abnormality (44%). Auditory working memory is highly dependent on the quality and stability of incoming acoustic information. Increased listening effort associated with degraded auditory input may theoretically consume cognitive resources that would otherwise support encoding and retention.

Rhythm abnormalities were observed in 42% and phonological impairment in 36%. These findings are biologically plausible

because accurate phonological development requires stable access to spectral and temporal speech cues.

Auditory discrimination was impaired in 26%, while 24% demonstrated reduced intelligibility. Lexical and morphosyntactic abnormalities were less frequent but remained clinically relevant.
This multidimensional pattern suggests that children with persistent OME should not necessarily be evaluated only for articulation or gross expressive delay.
At the same time, our treatment observations require particular caution.
The proportion of language abnormalities was lower among children who had already received tympanostomy tubes than among those awaiting surgery (62.07% versus 76.19%). However, this comparison was observational, treatment was not randomized, groups may have differed substantially at baseline, and there was no standardized paired pre/post-treatment assessment.

Accordingly, our study cannot establish that tympanostomy tubes improve language development.
This distinction is essential in light of randomized evidence.
Paradise et al. demonstrated that prompt tympanostomy-tube insertion in otherwise healthy young children with persistent effusion did not improve developmental outcomes compared with delayed insertion at six years [6], and follow-up to 9–11 years similarly failed to demonstrate a developmental advantage [7].

The clinical implication is therefore not that every child with OME and language concern requires immediate tube insertion.
Current evidence supports a more individualized strategy.
The 2016 AAO-HNSF guideline recommends identifying children at increased developmental risk, obtaining age-appropriate hearing testing when OME persists for three months or longer, and counseling families of children with bilateral OME and documented hearing loss regarding potential effects on speech and language development [1].

Children without additional risk factors may often undergo surveillance because many effusions resolve spontaneously.
Conversely, children with persistent bilateral OME, documented hearing impairment, parental or teacher concern, speech-language abnormalities, or developmental vulnerability warrant closer multidisciplinary evaluation.
Our findings therefore support collaboration between the otolaryngologist, audiologist, pediatrician, and speech-language pathologist.

The role of the speech-language pathologist should not be viewed as secondary to surgical management. In children with established language deficits, restoration of middle-ear ventilation does not automatically reverse developmental difficulties that have already emerged.

Clinical implications:
The results support three practical messages.
First, persistent OME should be considered not merely an otoscopic diagnosis but a condition requiring assessment of its functional auditory consequences.
Second, younger children and those with bilateral persistent disease and hearing concerns deserve particular developmental attention.
Third, when speech-language concerns are present, evaluation should extend beyond articulation to include phonological processing, auditory discrimination, vocabulary, morphosyntax, intelligibility, rhythm, and auditory-verbal memory.

Strengths and limitations:
The study provides detailed multidimensional speech-language characterization in a relatively understudied North African population and used an assessment battery adapted to the Moroccan context.
However, several limitations are substantial.

The sample was small and originated from a single tertiary center. There was no healthy control group. The cross-sectional observational design precludes causal inference. Hearing thresholds and duration/severity of conductive hearing loss were not available in sufficient quantitative detail for dose-response analysis. Socioeconomic and environmental confounders were not adjusted in multivariable models. Treatment groups were not randomized, and the study was not designed to determine the effect of tympanostomy tubes on language.

These limitations should explicitly temper interpretation of the high prevalence of observed abnormalities.

Conclusion

Persistent OME in this clinically selected Moroccan pediatric cohort was associated with a high burden of speech-language dysfunction, with abnormalities detected in 68% of formally assessed children.

The developmental profile extended well beyond articulation, involving working memory, rhythm, phonology, auditory discrimination, intelligibility, vocabulary, and morphosyntax.
The burden was particularly high among younger children.

These findings do not establish OME as the sole cause of language impairment, nor do they demonstrate that early tympanostomy-tube insertion improves developmental outcome. Instead, they highlight the importance of identifying the subset of children in whom persistent middle-ear effusion coexists with meaningful auditory and developmental vulnerability.

The clinical objective should therefore extend beyond clearing middle-ear effusion: it should include protecting access to speech during critical periods of language acquisition and identifying children who require targeted developmental support.

References

1. Rosenfeld RM, Shin JJ, Schwartz SR, et al. Clinical Practice Guideline: Otitis Media with Effusion (Update). Otolaryngol Head Neck Surg, 2016; 154: S1-S41.
2. Rosenfeld RM, Culpepper L, Doyle KJ, et al. Clinical practice guideline: otitis media with effusion. Otolaryngol Head Neck Surg, 2004; 130: S95-S118.
3. Roberts J, Hunter L, Gravel J, et al. Otitis media, hearing loss, and language learning: controversies and current research. J Dev Behav Pediatr, 2004; 25: 110-122.
4. Gravel JS, Wallace IF. Effects of otitis media with effusion on hearing in the first 3 years of life. J Speech Lang Hear Res, 2000; 43(3): 631-644.
5. Roberts JE, Rosenfeld RM, Zeisel SA. Otitis media and speech and language: a meta-analysis of prospective studies. Pediatrics, 2004; 113: e238-e248.
6. Paradise JL, Campbell TF, Dollaghan CA, et al. Developmental outcomes after early or delayed insertion of tympa-

nostomy tubes. N Engl J Med, 2005; 353: 576-586.
7. Paradise JL, Feldman HM, Campbell TF, et al. Tympanostomy tubes and developmental outcomes at 9 to 11 years of age. N Engl J Med, 2007; 356: 248-261.
8. Wallace IF, Gravel JS, McCarton CM, Ruben RJ. Otitis media and language development at one year of age. J Speech Hear Disord, 1988; 53(3): 245-51. doi: 10.1044/jshd.5303.245.
9. Nittrouer S, Burton LT. The role of early language experience in the development of speech perception and phonological processing abilities. The Volta Review, 103(1): 5-37.
10. Whitton JP, Polley DB. Evaluating the perceptual and pathophysiological consequences of auditory deprivation in early childhood, 2011.
11. Khavarghazalani B, Farahani F, Emadi M, Hosseni Dastgerdi Z. Auditory processing abilities in children with chronic otitis media with effusion. Acta Oto-Laryngologica, 2016; 136(5): 1-4.
12. Zumach A, Gerrits E, Chenault MN, Anteunis LJC. Long-term effects of early-life otitis media on language development. J Speech Lang Hear Res, 2010; 53(1): 34-43. doi: 10.1044/1092-4388(2009/08-0250).
13. Browning GG, Rovers MM, Williamson I, Lous J, Burton MJ. Grommets for hearing loss associated with otitis media with effusion in children. Cochrane Database Syst Rev, 2010; 2010(10): CD001801. doi: 10.1002/14651858.CD001801.pub3.
14. Venekamp RP, Mick P, Schilder AGM, Nunez DA. Grommets for otitis media with effusion in children. Cochrane Database Syst Rev, 2023; 11(11): CD015215. doi: 10.1002/14651858.CD015215.pub2.
15. Steele DW, Adam GP, Di M, et al. Effectiveness of tympanostomy tubes for otitis media: a meta-analysis. Pediatrics, 2017.
16. Rosenfeld RM, Tunkel DE, Schwartz SR, et al. Clinical Practice Guideline: Tympanostomy Tubes in Children (Update). Otolaryngol Head Neck Surg, 2022.
17. Schilder AGM, Chonmaitree T, Cripps AW, et al. Otitis media. Nat Rev Dis Primers, 2016; 2: 16063.
18. Rovers MM, Schilder AGM, Zielhuis GA, Rosenfeld RM. Otitis media. Lancet, 2004; 363: 465-473.