



Otitis Media and Language: Meta-analysis of Prospective Studies

FPG Snapshot

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CONSIDERABLE CONTROVERSY SURROUNDS THE QUESTION of whether a history of otitis media with effusion (OME) in early childhood causes later speech and language problems. We examined prospective studies to see

- 1) whether a history of OME in early childhood is related to receptive language, expressive language, vocabulary, syntax, or speech development in children 1 to 5 years, and
- 2) whether hearing loss caused by otitis media in early childhood is related to children's receptive language or expressive language through age 2 years.

Methods

We examined 38 studies of prospective or randomized clinical trials published between January 1966 and October 2002 that examined these issues. Of those, 14 had data suitable for examination.

Results

We performed 11 meta-analyses. There were no significant findings for analyses of OME during early childhood versus receptive or expressive language during the preschool years in the correlation studies.

Similarly, there were no significant findings for OME versus vocabulary, syntax or speech during the preschool years.

Conversely, there was a significant negative association between OME and preschoolers' receptive and expressive language in the group studies. Children with a greater history of OME has slightly lower receptive and expressive language in the preschool years. Also hearing was related to receptive and expressive language in infancy. Children with a greater history of hearing loss due to OME had slightly lower receptive and expressive language in infancy.

Conclusions

Our results indicate no association to very small negative associations between OME (and associated hearing loss) and children's later speech and language development.

These findings may overestimate the effect of OME on the speech and language outcomes because most studies did not adjust for known confounding variables (such as socioeconomic status) and excluded some data suitable for statistical pooling.

The clinical relevance for children with developmental disabilities is not known.

Discussion

There continues to be considerable debate over whether a history of otitis media (OM) with effusion (OME) during the first few years of life, a critical period for learning language, causes later speech and language difficulties. When a child has OME, a mild to moderate fluctuating hearing loss generally occurs that has been hypothesized to interfere with rapid language processing, causing a child to encode information inefficiently, completely, or inaccurately into the database from which language develops.

If OME and the associated hearing loss persist or recurs during the formative years of language and learning, it has been hypothesized to delay language development, possibly affecting vocabulary or grammar.

Most of the data in these studies analyzed in this article were not adjusted for known confounding variables (e.g., maternal education, socioeconomic status, and childcare environment) that have been shown to explain a considerably larger portion of children's language development than OM.

The negligible association of OME with developmental outcomes suggests that differences in otherwise healthy children are detectable only by larger studies or meta-analysis to increase statistical power.

Hearing, but not OME, was a significant predictor of outcomes, suggesting an association between hearing and language development. This linkage

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This Snapshot is based on "Otitis Media and Speech and Language: A Meta-Analysis of Prospective Studies" published in the March, 2004, issue of *Pediatrics* (Vol. 113, No. 3, pp 237-247). Authors include Joanne Roberts and Susan Zeisel of the FPG Child Development Institute.

would conceptually make sense, because hearing loss, not OME, is hypothesized to affect children's language development. The hearing analyses, however, were done on infant language outcomes, whereas all other analyses were done on preschool speech and language assessments.

Thus, it is hard to compare the results and determine whether there would be similar findings for hearing in the preschool years. These data, also, may suggest a threshold amount for OME and/or associated hearing loss where having OME may place a child at greater risk for language differences and be more evident when analyses consider children with the least and most amounts of OME.

The meta-analyses presented only assess the association of OME to speech and language during the preschool years and of OME-related hearing loss to language during infancy. Other age groups may be more sensitive to the effects of OME and associated hearing loss.

Interestingly, the meta-analyses results were more significant for overall measures of expressive language than for the measures of individual domains of language: vocabulary and syntax. We cannot tell if this difference reflects a true difference in the impact of OME or a reflection of the studies included in the analyses.

Additionally, because many of the studies in each group and correlation analysis did not include measures of factors such as dimensions of the home environment, which have been shown to be important predictors of children's language development, we cannot rule out that factors that predispose children to experience more OME also may affect speech and language development.

A final but important limitation of our study concerns the generalization of the findings. The small effect sizes we found may be unimportant for most otherwise-healthy children with OME, but the impact may be different for children with developmental delays, from special populations (e.g., Down syndrome), or with baseline hearing loss independent of OME. For these at-risk populations, even minor auditory degradation from OME could possibly affect development outcomes.

Similar concerns exist for children with pre-existing speech or language delays.

Future research should measure hearing loss and other variables that may affect the OME developmental linkage. Most studies used OME, not hearing, as the independent variable, although hearing loss rather than OME is hypothesized to affect language. Factors should also be studied that may mediate or moderate developmental outcomes.

Additionally, the effect of persistent OME and associated hearing loss should be studied in different populations including at-risk children.

Conclusions

Meta-analysis provides systematic review of the evidence but cannot substitute for assessing and treating each child individually. We found no to very small associations of OME to speech and language development in most children.

However, the existing evidence was not always combinable or generalizable. Moreover, these results could leave many clinicians in a dilemma as to what to do when a child experiences persistent OME. It may suggest that ignoring the OME and associated hearing loss for a young child is a reasonable approach; however, this may not always be the case.

The relative risk, for example, for a particular child of not screening hearing and missing a moderate degree of hearing loss caused by OME must be weighed against the advantages of giving the child the optimal language and learning environment.

The data here reflect outcomes for an average, otherwise-healthy child; factors affecting language development of each individual child must also be considered, including hearing status, language skills, development, and supportiveness of the child environment. ■

Brochure on ear problems available

Ear Infections & Language Development, a publication by the National Center for Early Development & Learning at FPG explains how ear infections may affect a child's language development and what you can do to help.

It is available online in PDF format at www.fpg.unc.edu/~NCEDL/PDFs/ome2000.pdf and HTML format at www.fpg.unc.edu/~NCEDL/pages/ome.htm



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