



Otitis media: Is precursor of delayed reading in Arabic speaking children?



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ABSTRACT

Objective: To investigate the relation between otitis media in the language acquisition years and the occurrence of delayed reading between the ages of 7 and 10.

Method: Participants were 40 children, half of whom had a history of otitis media between the ages of birth and three years and half who were free of the disease. These children, now ages 7–10, were tested with the Stanford Beint and Arabic Dyslexia Assessment Test.

Results: Children with a history of otitis media scored over a year below grade level in reading and significantly below controls on Arabic Dyslexia Assessment tests as well as on the Verbal IQ factor on the Stanford Binet.

Conclusions: Children with early onset otitis media (birth to three years) tend to be at greater risk for delayed reading than age-matched controls.

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1. Introduction

Otitis media (OME), an infection of the middle ear cavity, is one of the most common afflictions of childhood. In OME there is accumulation of fluid in the middle ear, and sound traveling through the ear canal is impeded. Most young patients experience a mild-to-moderate hearing loss during OME episodes, especially in the decibel range critical for discriminating speech sounds [1,2]. Previous studies regarding the effect of OME and middle-ear effusion with the attendant hearing loss on speech, language, and academic achievements have given inconsistent and often contradictory results. Most studies have shown that once OME has subsided and normal or near-normal hearing has been restored, previously noted speech and learning impairments might become less severe or no longer evident [3]. Only a few authors have found that middle-ear disease, if it persists enough during early childhood, may adversely affect children's language, speech, and academic achievements later in life well after the pathology resolves and hearing returns to normal [4]. Hearing loss is usually temporary, but periods of impairment often persist for 6–24 months.

Lengthy periods of fluctuating sensitivity to speech sounds can delay early language development and impair the formation of linguistic categories [5,6]. A large longitudinal study from

New Zealand concluded that OME in early life was associated with delayed reading ability even up to the age of 15 year. Two nationwide Finnish studies concluded that the detrimental effects of early OME might last in some cases up to the age of 9 years despite active treatment [7]. The stable auditory basis for constructing the rules and vocabulary of language is interrupted as well [8,9] found that mild, fluctuating hearing loss during infancy disrupted both expressive and receptive language acquisition.

Auditory processing and language acquisition deficits resulting from early OME episodes can persist into the elementary school years. Thus, language defects are common among children who suffer repeated episodes of OME during really language acquisition and because learning to read draws heavily on language skills, repeated early OME episodes during early language acquisition might well be a precursor of delayed reading [10,11].

Children who experienced multiple OME episodes during primary language acquisition will find learning to read more difficult than age-matched peers who were free of this disorder [12]. That is, children with a history of OME should perform worse on measures of basic reading skills-phonology and verbal comprehension-than nonotitic age-mates [16].

2. Method

2.1. Participants

Participants were 40, second, third, fourth, and fifth graders, 28 boys and 12 girls, between the ages of seven and ten. The children were Egyptian. And all lived in Beni-Suef city and rural

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neighborhoods near the University of Beni-Suef. Half had a history of repeated episodes of OME before age three, the other served as matched controls.

2.2. Measures

- A. *Stanford-Binet Intelligence Scales, Fifth Edition (SB5)*. The Stanford-Binet Intelligence Scales, Fifth Edition (SB5) was used to assess the overall intellectual strengths and weakness of the participants. In addition to a full scale IQ score, the (SB5) yields three factor-analytically distinct scores: Verbal IQ, Non Verbal IQ and Working Memory [13].
- B. *The Arabic Dyslexia Assessment Test (ADAT)*. The Arabic Dyslexia Assessment Test is a test designed for Arabic speaking children in the age group of 6.6–10.6 years old.

The test is in the Arabic language and adapted to suit Egyptian children The (ADAT) yields some factor-analytically distinct scores [14].

General instructions of (ADAT) application:

The test should be done individually.

Apply the test in a quiet room.

The test includes 11 items and if all test items are not applied, divide the final score by the number of tests that were actually applied except if one of them was the semantic fluency then in this case divide by one less than the number of tests applied.

The selected items are:

1-Rapid naming test (RNT): To assess rapid naming (RNT), ask the child to start naming the minute you say “go”. Start the stop watch when the child starts naming and stop it once he/she finishes the whole sheet of pictures on the picture card (20 pictures). If the child loses his/her place correct him/her immediately. Note any naming mistakes. If the name spoken is plausible or if the child self-correct, do not score it as a mistake. If the child gets stuck on a word, say it to him/her after 5 s. *Scoring*: add 5 s to the time taken for each mistake. Record the time in seconds and the number of mistakes on the record form. If a child makes a plausible error do not score it as a mistake (e.g. *بننت* instead of *بننت*).

2-One minute reading (OMR): The child is asked to read aloud a page of individual words. At first the child reads a practice sheet with 6 words on. According to the age of the child we select one of 2 forms; form A to the children below the age of 8 years 6 months the version has 4 columns of 15 words, while children above that age has form B which has 4 columns of 30 words. Ask the child to start at the top of the sheet and go all the way down the column and then start at the top of the next column (demonstrate by tracing down the route). Ask the child to read quickly and correctly, if he/she gets stuck on a word, say pass and go to the next word.

Start the stop watch when the child starts reading. Write down the number of errors and passes, and stop the stopwatch when the child has completed exactly one minute, note the last word the child read. If the child finished the whole page before one minute write down the time taken.

Discontinue the test after 5 consecutive errors (ignoring passes). If a child passed 5 consecutive items and the minute is not yet up, ask him/her if they can read any of the following 5 items then discontinue, giving credit for any of the next five words read correctly.

Scoring: subtract the number of errors and passes from the total number of words read to get the score. If the child finished before one minute, add 1 point for each second less than 60.

3-Semantic fluency (SF): Start a trial with the child and ask him/her to think of lots of examples of a particular type of thing, for example names of foods. Ask the child to say as many words as he/she can which are names of animals in one minute. Write down the words the child says, if the child is very fast we can use ticks. Do not stop until the minute is up, even if the child says he/she cannot think of anything more. Encourage the child to try more.

Scoring: score one point for each different valid word. Accept anything that is alive which is not a plant. No penalty for mistakes or repetitions.

4-Nonsense passage reading (NPR): nonsense passage reading (NPR) was used to assess phonetic capability. Ask the child to read the passage we will give to him/her. The passage has nonsense words in it as well as real words, so do not expect it all to make sense. We want to know how long would it take and how accurate you are. First there is a practice card that can help the child understand the idea. Start with the practice card, encourage the child to try to read all the words but if could not they should say pass. Correct the child while reading the practice card. Give the child the passage appropriate for the age. Start the stopwatch when the child starts reading, and stop when he/she reaches the end or has taken 3 min. Write down any errors or passes on the score sheet and note down the time taken. Discontinue when the child makes 5 consecutive mistakes or gives up or after 3 min. Respondents were asked to pronounce nonsense words constructed according to commonly understood rules of Arabic phonics.

Scoring: give one point for each word read correctly. For each of the nonsense words give 2 points for correct reading and one point for a close try. This yields a maximum word score for passages A and B of 48 and 54 respectively.

If the time taken is less than a minute, add 1 extra point for every 2 s under the minute, up to a maximum of 10 (so we add 5 points for 50 s and 10 points for 40 s or less). Bonus is given only if 15 or more were scored for the nonsense words. If the time taken was more than a minute, subtract 1 point for every 2 s over the minute. The penalty should not be more than half the score.

5-Phonemic segmentation (PhS): In this test we speak the words, and ask the child to segment them by deleting a syllable or a consonant firstly through the 3 practice items, then throughout the main test but do not say whether right or wrong. Note down on the record form the right and wrong answers. Stop the test if the child has got the first 4 words wrong and if there were 3 consecutive errors.

Scoring: the total score is the number correct in the main test. *Entering the scores*: Write the test scores in the Test Score Column, find the score key appropriate for the child's age. Place it carefully on top of the sheet. Enter the at risk index scores in the third column of the score table. Write down the numbers of (–), (–) and (–) scores. Give the number that your examinee took for (–) the letter A, B for the number of (–) and C for the number of (–) then calculate the formula to get the at risk score which is: $(3 \times A) + (2 \times B) + C = D$ and at risk quotient = $D/10$.

If the at risk quotient was ≥ 1 then this is a strong evidence of being at risk.

For example the child scored in 3 test items (–) so $A = 3$

And he scored in 4 test items (–) so $B = 4$

And he scored in 4 test items (–) so $C = 4$

The At Risk Quotient will be: $3 \times 3 + 2 \times 4 + 4 = 21$

$ARQ = 21/10 = 2.1$

Reading level: All the data collected from the literacy measures were given to three professionals in the field of reading: two reading professors and the phoniatrician. Based on this information, each independently rated the overall reading

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