

Point prevalence of type B tympanogram in children

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ABSTRACT

Objective: Otitis media with effusion is a common disease; it is primarily a disease of children. Otitis media with effusion was found as the most common cause of hearing impairment among children. The prevalence varied in different populations. Using otoscopy and tympanometry usually gives a valuable indication of the presence of otitis media with effusion. The aim of this study is to determine the point prevalence of type B tympanogram as a diagnostic and indication of the presence of otitis media with effusion.

Methods: This study was carried out during the period September 1997 through to May 2000. The study population consisted of 9540 children aged one year to 12 years from the 4 provinces of the country. Otoscopic

examination and audiologic assessment were carried out using Grason Stadler Incorporation 30-33. The tympanograms were divided into A, B, C one, and C2 groups.

Results: The point prevalence rate of type B tympanograms among children was 8.2%. The prevalence of otitis media with effusion was 7.5%

Conclusion: This study indicates that tympanogram has a significant role in otitis media effusion.

Keywords: Otitis media with effusion, tympanometry type B, hearing impairment, young age.

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Tympanometry is an objective measurement of aural acoustic immittance. It is helpful in the screening of children for otitis media with effusion (OME) and therefore hearing loss. The aim of the study is to determine the prevalence of hearing impairment among Saudi children and the value of tympanometry in diagnosis of hearing impairment due to OME, its relation to consanguinity and gender.

Method. A total of 9540 Saudi children of preschool and school age below 15 years of age were screened for hearing impairment. This is a national study carried out in the Kingdom of Saudi Arabia, during the period September 1997 through to May 2000. The children were recruited from various

provinces of the country to health centres selected randomly. Families were asked to report to the center for hearing assessment of their children. The response of the families was 69%. Examinations were performed by a team of Otolaryngologist, Audiologist, Social worker and a Nurse were working together moved to different centres. After completed a prepared questionnaire (World Health Organization (WHO)/Prevention of Deafness and Hearing Impairment (PDH) modified form) which include name, age, gender, parent relation, family history past and present history. Ear, Nose and Throat (ENT) physical examination by an otolaryngologist was carried out and reported any pathology in the ears namely, earwax or foreign body

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removal if any. Children with perforation of tympanic membrane, with active discharge or with gromit tube were excluded from the study and the audiologist carried out tympanometry using Grason Stadler Incorporation 30-33 equipment and pure tone using alternat current 30 interacoustic and Madsen 822 at frequencies 0.5, 1,2 and 4 KHz. The tympanograms were divided into type A (0-99 mm H₂O pressure), type C one and C2 (-100 to -199- -200-350 mm H₂O) and type B (flat curve without an impedance minimum). Those suspected of hearing impairment or with type B or C tympanograms, a full audiological assessment was carried out including brain evoked auditory response for the very young and uncooperative children. This was carried out in the hospital with a fully equipped Audiology Department. The data were analyzed by X² test using epidemiology information computer software.

Results. Nine thousand, five hundred and forty children were screened during the period September 1997 to May 2000 (33 months) They were recruited from the 4 provinces of the country (Central, Eastern, Western and southern) There were 4189 (44%) boys (male) and 5351 (56%) girls (female) their age varied up to 4 years 2054, >4 to 8 years 3615 and >12 to 15 years 440. Consanguinity of parents 19% were first cousins, 28% were 2nd cousins or relatives, the rest has no family relationship. Hearing impairment was found among 13% of the total children surveyed. Seven hundred and seventy nine children were found to have type B tympanogram (8.2%) of the total. In the different age group, the older the children, the less type B and otitis media with effusion **table 1**. This prevalence rate forms a mean for all seasons with peak prevalence during the months of January and February. In male children the prevalence of type B tympanogram was 9.3% compared to 7% in female. No significant relation to consanguinity. Otitis media with effusion was found and proved in 711 children with a prevalence of 7.5%. There is a significant correlation between OME and type B tympanograms **Table 2** shows the various types of tympanometry and its percentage.

Discussion. Clinical ear examination using a pneumatic otoscope is a subjective manouever with low sensitivity and specificity. Tympanometry is objective and reliable with a high degree of sensitivity and specificity. (Zilheim 1990)¹ The response of families to report for hearing assessment was very good with 69% participation rate. Middle ear effusion has been demonstrated in 85%-100% of children with type B tympanograms. (Tos)² In our study it was proved in 91.3% of those children with type B tympanograms. The prevalence rate was calculated per children and not per ear as suggested by Fielan-Nikolajsen.³ Our results showed higher

Table 1 - Number, age group and percentage of type B tympanograms.

Age Group	N (%)
< 4 years	295 (3.1)
4 - 8 years	264 (2.8)
> 8 - 12 years	200 (2.1)
> 12 - 15 years	20 (0.2)
Overall prevalence of type B is 8.2% Male (Boys) = 9.3% Female (Girls) = 7%	

Table 2 - Tympanogram types A, C one, C2 and B for children surveyed.

Types	N (%)
A	7048 (73.9)
C one	183 (1.9)
C2	56 (0.6)
B	779 (8.2)
No record	1474 (15.4)
Total	9540 (100)

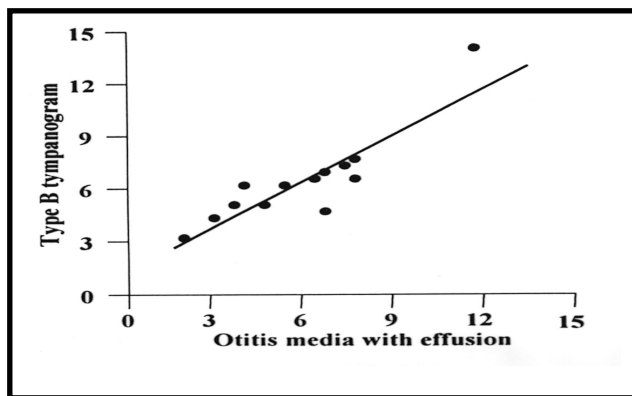


Figure 1 - Correlation between the prevalence of otitis media with effusion and type B tympanogram (r=0.89).

prevalence of OME and type B tympanograms in male children. Maw⁴ had demonstrated a high incidence of OME in males than in females. The male predilection may reflect the overall male predominance for childhood infection. Tos and Stangerup^{2,5} reported reduced pneumatization of the mastoid air cell system in children with OME, with

the boys having smaller systems and greater degree of pathology than girls. The prevalence of OME and type B tympanograms in our study was high in children up to 8 years of age namely 5.9%; thereafter it decreased with the increasing age 2.1 at age 12 years. A survey of 14,509 children from Japan, aged 4 years to 8 years showed the prevalence of type B tympanograms to be highest in the children at 4 years (19.3%) which decreased to 3.6% in 8 years old children. (Takasaka 1990)⁶ One of the findings of our study was the high prevalence of OME and type B tympanograms in the children from the southern province. This might be due to geographical reasons, high altitude, and mountains. Overcrowding, poor attendance for health care and undernutrition may be blamed as it was reported that prevalence of otitis media is more in these conditions. Minja and Machemba⁷ attributed the low prevalence of otitis media in urban school children than rural children to better medical services which facilitate early diagnosis and better treatment. Previous studies by El-Sayed and Zakzouk⁸ and Shah⁹ failed to demonstrate an association between prevalence of OME and socioeconomic status of the community. The point prevalence of OME has been known to be affected by seasonal variations with the highest rate occurring in winter. We used our data to determine the correlation between the frequency of OME and type B tympanograms. The results showed a significant correlation between OME and type B tympanograms, suggesting that type B tympanograms could play an important role in the diagnosis of OME (**Figure 1**). Our findings are in agreement with earlier investigators who observed a close relationship between OME and type B tympanograms. Recently Spremo et al¹⁰ also emphasized the clinical importance of tympanometry in the diagnosis of OME with a sensitivity of 96%. Our results also showed a significance association between type B tympanograms and hearing impairment.

The results of this study clearly demonstrated the value and accuracy of tympanometry in diagnosis of hearing impairment due to OME. It was concluded that a significant correlation between type B tympanograms and OME was found. Hearing impairment due to OME is common in the young age group, males are more affected than females. There is no significant relation to consanguinity or socioeconomic factor.

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