

Abstract

Aims: The aim of the study was to evaluate the effectiveness of wideband absorbance (WBA) at ambient pressure (WBA_{amb}), tympanic peak pressure (WBA_{TPP}) and 0 daPa (WBA_0) to identify conductive hearing loss (CHL) in infants. **Population:** A total of 31 ears with normal hearing (NH) from 20 infants (mean age 3.1 weeks) and 47 ears with CHL from 31 infants (mean age 3.4 weeks). **Methods:** Normal hearing status was determined using air-conduction tone-burst auditory brainstem response (TB-ABR) test while conductive hearing loss was determined using both air- and bone-conduction TB-ABR tests. High frequency tympanometry (HFT) with a 1000-Hz probe tone, transient evoked otoacoustic emissions (TEOAE), and WBA tests were conducted on all participants. **Results:** WBA_{amb} , WBA_{TPP} and WBA_0 of the CHL group were significantly lower than that of the NH group across a wide frequency range. Area under the receiver operating characteristic curve (AROC) for detecting CHL varied from 0.51 to 0.9 depending on the frequency. The highest AROC was obtained at 1.25 kHz for WBA_{amb} (0.79), at 1.5 kHz for WBA_{TPP} (0.9) and at 1 kHz for WBA_0 (0.80). **Interpretation:** The sensitivity and specificity for the three WBA tests were ≥ 0.85 and ≥ 0.80 , respectively. The sensitivity and specificity were 0.98 and 0.45, respectively for HFT, and 1.0 and 0.6, respectively for TEOAE. In comparison, the WBA tests had slightly lower sensitivity but higher specificity than the HFT and TEOAE tests. **Conclusion:** The WBA_{amb} , WBA_{TPP} and WBA_0 tests had good balance of high sensitivity and specificity compared to HFT and TEOAE. The three WBA tests are useful tools for identifying CHL in infants under six weeks of age.

Objectifs

While studies have investigated the accuracy of WBA_{amb} in identifying conductive hearing loss (CHL) in young infants (< 6 weeks), the ability of wideband tympanometry (WBT) results to identify CHL in this age group has not been explored.

In this study, we compared the test performance of WBT results (WBA_0 and WBA_{TPP}) with that of WBA_{amb} , 1000-Hz tympanometry (HFT) and transient evoked otoacoustic emissions (TEOAE) in identifying CHL in young infants (<6 weeks). This study is important for early detection and intervention of conductive hearing loss in infants beyond the postnatal period.

Méthodes et Matériels

Participants: CHL group - 31 infants (47 ears) diagnosed to have CHL by AC- and BC-TB-ABR; NH group – 20 infants (31 ears) with repeatable wave V responses down to 30 dB nHL at 1kHz and 20 dB nHL at 4 kHz by AC-TB-ABR.

Methods: HFT, TEOAE, WBA tests and TB-ABR tests were conducted on all participants.

Résultats

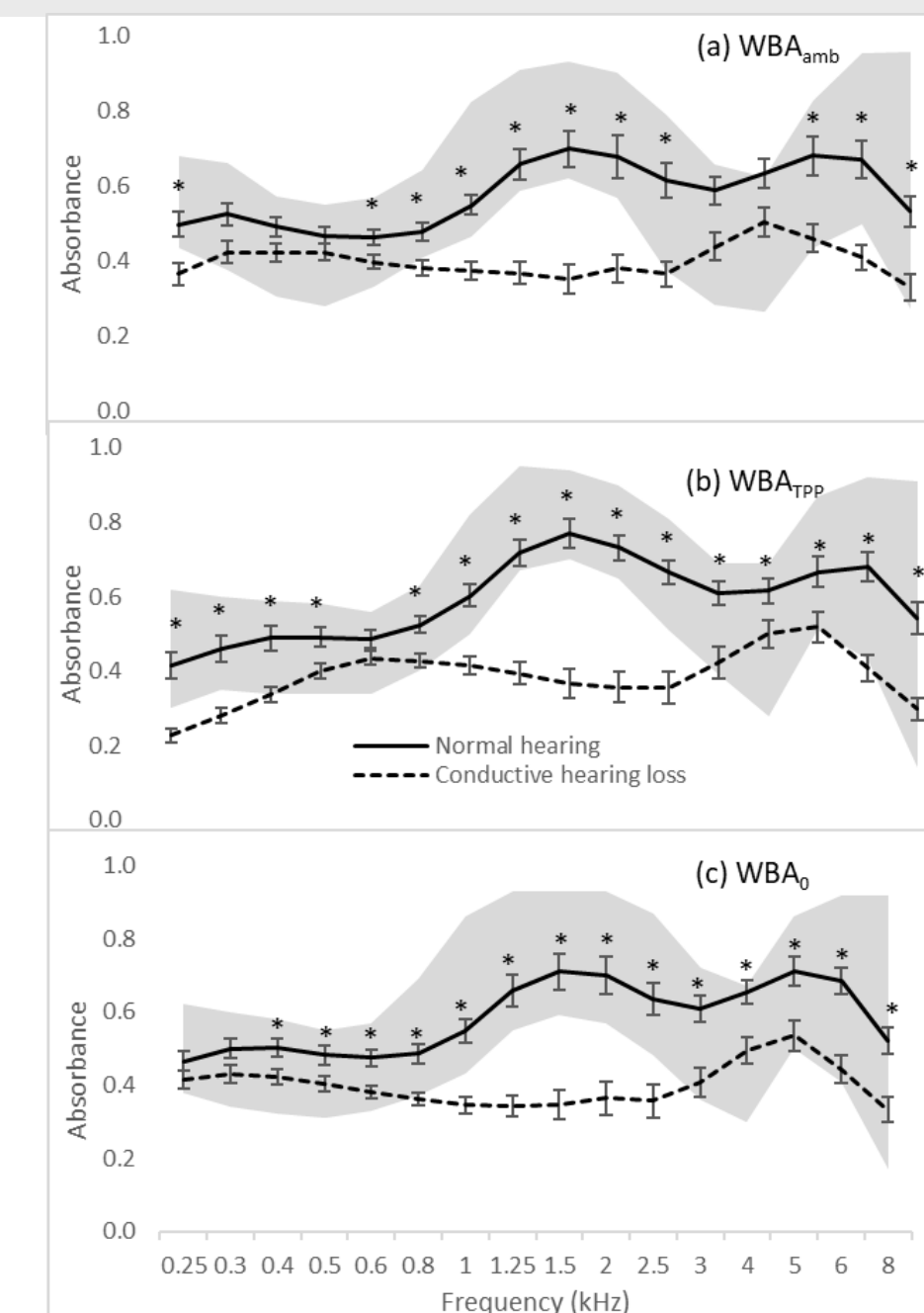


Figure 1. Comparison of mean WBA between the NH and CHL groups.

* denotes significance difference ($p < 0.05$)

Figure 1 shows that mean WBA_{amb} , WBA_{TPP} and WBA_0 were lower in the CHL group than that in the NH group at all frequencies.

Table 1 shows that WBA_{TPP} at 1.5 kHz has the highest AROC among the five measures. Further, the WBA_{amb} , WBA_{TPP} and WBA_0 tests had good balance of high sensitivity and specificity compared to the HFT and TEOAE tests.

Table 1. Optimal test performance of five measures in detecting CHL in infants

	AROC	Sensitivity	Specificity
WBA_{TPP} @ 1.5kHz	0.90	0.86	0.94
WBA_0 @ 1.5kHz	0.79	0.86	0.72
WBA_{amb} @ 1.25kHz	0.79	0.88	0.71
HFT	0.80	0.98	0.45
TEOAE	0.76	1.00	0.60

AROC - Area under the receiver operating characteristic curve

Conclusion

Conclusion: WBA_{TPP} had the highest accuracy in detecting CHL, compared to WBA_{amb} and WBA_0 , HFT and TEOAE, suggesting that WBA_{TPP} is the most appropriate test to differentiate infants with NH from infants with a CHL.

Limitations: (1) The small number of participants in both groups may affect generalization of results to the infant population. (2) Recruiting participants from a clinical sample (infants who initially failed the newborn hearing screen) may have affected the test performance results as the prevalence rates of the CHL in subject samples can vary significantly.

Références

Aithal V, Aithal S, Kei J, Anderson S, Wright D. Predictive accuracy of wideband absorbance under ambient and tympanometric peak pressure conditions in identifying children with surgically confirmed otitis media with effusion. *J Am Acad Audiol.* 2020;1-15

Prieve BA, Vander Werff K, Preston JL, Georgantas L. Identification of conductive hearing loss in young infants using tympanometry and wideband reflectance. *Ear Hear.* 2013;34:168-178.