

Wideband Acoustic Immittance Measures As Part Of A Newborn Hearing Screening Program In Canadian First Nations And Metis, Caucasian And Other Ethnicity Neonates

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Objectives: The goal of Newborn Hearing Screening (NHS) Programs is to treat hearing loss by the time a child is 6 months old. Early treatment gives a child access to sound in the developing months which allows them to develop speech and improve learning outcomes. Early diagnosis is necessary to achieve early treatment. Fluid in the middle ear prevents an early diagnosis of sensorineural hearing loss and long-term fluid can cause a conductive hearing impairment that also affects speech and learning. First Nations and Metis children have a higher prevalence of chronic middle ear fluid. This study added Wideband Absorbance (WBA), a method of sending sound at the eardrum and measuring how much is absorbed, to a NHS protocol to diagnose middle ear fluid at birth. This study also documented prevalence of middle ear fluid and looked at the differences in Wideband Absorbance in newborns of different ethnicities.

Background: There are few data on the prevalence of Otitis Media (OM) in neonates of all ethnicities, especially First Nations and Metis (FNAM) neonates, at birth. There is a need to diagnose type of hearing loss at the time of Newborn Hearing Screening (NHS) to determine prevalence and to refer neonates for timely assessment and intervention. Wideband Acoustic Immittance (WAI) is a viable tool that can aid in the diagnosis of conductive hearing loss (CHL) at time of hearing screening.

Methods: This cross-sectional study examined the application of WAI measures (Wideband Absorbance (WBA) at Ambient and Tympanometric Peak Pressure (TPP), and Admittance Phase (Yi) as part of a regular NHS protocol. NHS pass/fail rates, likely diagnoses and WAI measurements in FNAM newborns were compared to newborns of other ethnicities. 213 neonates (426 ears) were recruited from the Royal University Hospital in Saskatoon, Saskatchewan. 382 ears met the inclusion criteria: 42 FNAM, 212 Caucasian, 48 Other Ethnicities, and 80 Undeclared Ethnicity.

Results: FNAM neonates had a significantly higher NHS fail rate than Caucasian neonates. The WBA of FNAM neonates was significantly lower than that of neonates of other ethnicities in both NHS pass and fail conditions. WBA was significantly lower for neonates who failed the test battery and who failed Transient Evoked Otoacoustic Emission (TEOAE) testing. The difference in WBA at peak pressure was larger than the difference at ambient pressure for neonates who passed or failed a NHS test battery. Yi was significantly lower in neonates who passed the test battery and who had a likely diagnosis of normal hearing.

Conclusions: WBA and Yi are effective in distinguishing ears with likely CHL from normal hearing ears. Pressurized WBA may be more effective than ambient WBA and Yi is a promising measure in the diagnosis of CHL.

FNAM neonates have a higher NHS fail rate and a greater prevalence of likely CHL. WBA of FNAM neonates is lower than that of other ethnicities. Further research is needed to determine if lower WBA in FNAM neonates indicates a greater prevalence of OM or if there is a difference in middle ear anatomy that reduces absorbance of sound compared to neonates of other ethnicities.