Balance in Deaf & Hard of Hearing Adults vs. Typically Hearing Adults: A Cross-Sectional Study

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Background

• >30 million deaf or hard of hearing (DHH) individuals in America¹
• DHH individuals face unique challenges: health inequities, communication barriers, higher chance of concerns related to vestibular dysfunction²,³
• Vestibular function helps maintain balance when the head/Body change position
• When the vestibular system isn’t functioning properly individuals are at a higher risk for falls⁴
• Deaf children have balance deficits, but no rigorous studies have looked at balance in deaf adults ⁵

Research Design & Methods

• Participants:
  - N_DHH=10, N_C=10
  - Age: M_DHH=62 years old (SD=13.7), M_C=28 (SD=8.2) years old
  - DHH dx: Deaf (4), Bilateral Sensorineural Hearing Loss (5), Bilateral High Frequency Hearing Loss (1), 5/10 have cochlear implants
  - Recruitment: Dane County ODHH and Southwest WI/Dane County Aging and Disability Resource Center. Controls: UW-Madison OT Program
• Cross-sectional design: DHH vs. Controls
• Data collection sessions completed at UW-Madison
• Mini-Balance Evaluation Systems Test
  • Video recorded
  • Inclusion Criteria: 1) deaf or HoH, 2) vision at or better 20/40, 3) can walk for ≥ 10 min continuously, 4) ages 18+ 5) MMSE score ≥ 26, 6) informed consent
  • Exclusion Criteria: 1) age-related hearing impairment, 2) Nonparametric statistics: Shapiro-Wilk < 0.001
• Statistical Analysis: Independent Samples Mann-Whitney U Test

Results

• MiniBESTest total and subcategory scores were analyzed separately
• DHH adults were found to have lower total balance scores on average (M=23.2, SD= 3.55) than controls or typically hearing adults (M=26.0, SD=1.15). Scores are out of 28 possible points.
• There was a significant difference in balance scores between the two groups, p=0.043
• Two of the four subcategory scores were significantly different: Anticipatory Transitions, p<0.023; Postural Responses p=0.796; Sensory Orientation, p=0.023; Dynamic Gait, p=0.143
• The effect size d of 1.06 indicated a large effect
• There was not a significant difference in balance scores in the subcategories of reactive postural control or dynamic gait
• Tasks that isolated the vestibular sense by removing other mechanisms for maintaining balance (eg. Closing eyes while standing on foam, incline) appeared to challenge DHH participants' balance the most

Figure 1.

• Lower balance scores may indicate that DHH adults are at a higher risk for falls than their typically-hearing counter-parts
• DHH adults may be experiencing limitations in their ability to participate in ADLs particularly when vision is limited i.e. Dim lighting, at night
• 5/10 participant had Cochlear implants; may be contributing to balance challenges if vestibular system disrupted in surgery
• Brainstem mechanisms for balance appear to help compensate for postural changes

Implications

• DHH adults are not receiving specialized health care to address balance
• This population may benefit from OT services to address compensatory strategies and overall balance during occupations
• DHH adults at a higher risk for preventable conditions², implies a need for annual comprehensive balance assessments and health screenings
• Research needed to investigate ADL-specific balance problems

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References