

The Auditory Outcomes in non-blast related Traumatic Brain Injury and the Role of Severity, Aetiology and Gender: A scoping review

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Abstract

- Traumatic Brain Injury (TBI) is a structural injury and/or deterioration of brain functions resulting from an external force¹. TBI is known to cause **auditory problems** as well as various symptoms.
- Despite numerous studies on auditory functions related to TBI, a comprehensive review of common auditory findings specific to non-blast related TBI remains absent.



Objectives

- This review aimed to synthesise common auditory findings related to non-blast related TBI, including the impact of TBI aetiology or the relationship, of TBI severity and gender with auditory conditions.

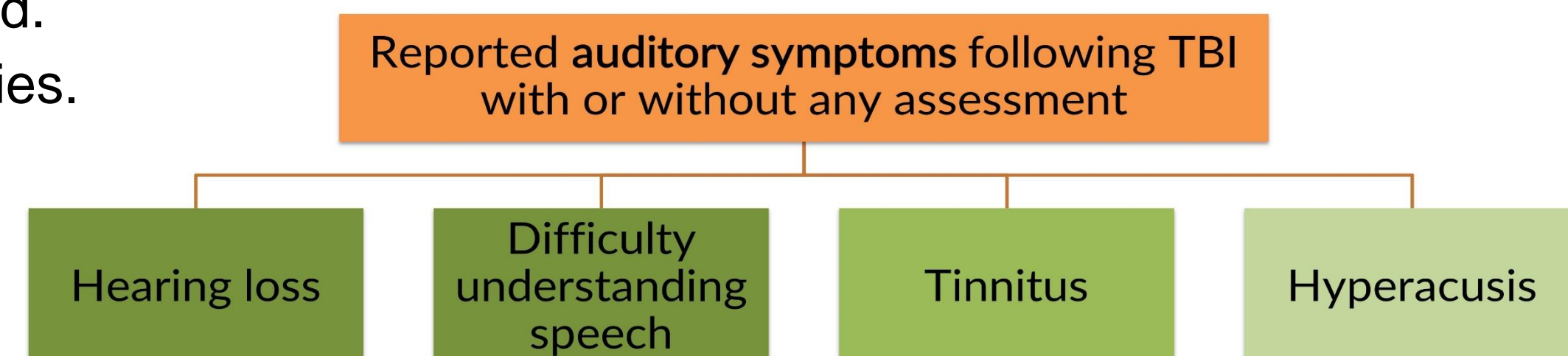
Methods

- The scoping review is reported according to the methodological framework developed by Arksey and O'Malley, (2005)².
- Data were collated and categorised based on the objectives of our research.

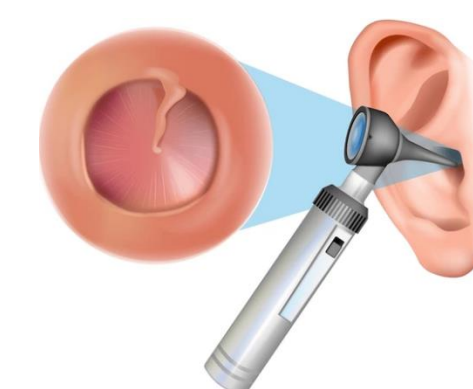
Inclusion Criteria	Exclusion Criteria
Adults aged 18 and older	Military personnel or veterans
Reporting hearing assessment and outcomes (incl. self-reported).	Blast-related TBI, non-TBI (e.g., strokes, acoustic neuroma), Whiplash injuries,
Symptoms before treatment	Existing audio-vestibular impairments pre-TBI
Cohort studies, case series/studies, grey literature (dissertations and theses)	Studies lacking clear TBI definition or evidence of structural/functional impairment
Published in English language	Aetiology of TBI is not reported

Results

- Out of 16162 records, **59** were included.
- 88%** of records were case series/studies.
- 37%** of records were conducted in the **USA**, and **10%** in the **UK**.
- Total **313** participants
 - patients with TBI n=223
 - control n=90

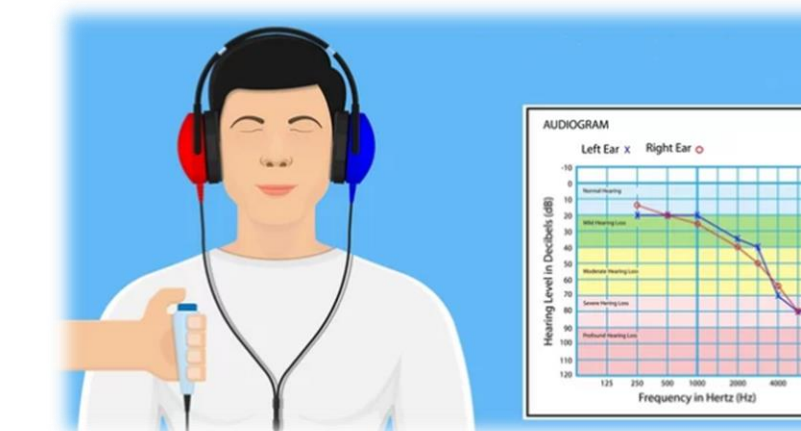


Results



The most commonly used assessments across records:

- ✓ 95% - Pure-tone Audiometry (PTA)
- ✓ 46% - Otoscopic assessment



PTA results:

- Different types of hearing loss were reported conductive (CHL) to mixed (MHL)
- 41% (24/59) reported **sensorineural** (SNHL).
- 30% (18/59) reported **normal hearing** (≤ 20 or 25dB HL), but 5 found abnormal results in at least one central auditory test.

Effect of severity of non-blast related TBI on auditory outcomes

- Studies with mild TBI (n=5), concussion (n=5), severe TBI (n=13)
- Various outcomes from normal hearing, total deafness, CHL, MHL
- ❖ Tinnitus and hyperacusis were reported in both mild and severe TBI.

Effect of aetiology of non-blast related TBI on auditory outcomes

- Following Motor Vehicle Accidents (MVA): SNHL (n=12), CHL (n=11)
- Various outcomes from normal hearing to total deafness or MHL
- ❖ Tinnitus and hyperacusis were reported in both MVA and falls.

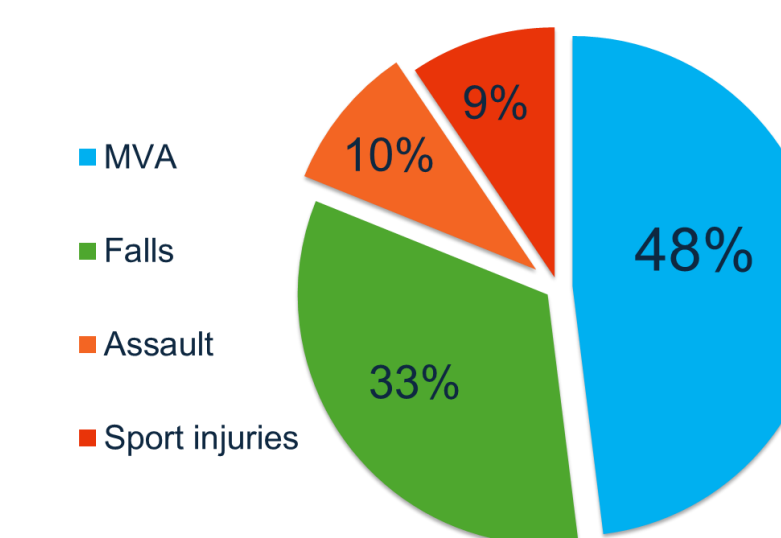


Figure 1. The percentage of non-blast related TBI aetiologies in records

Effect of gender on auditory outcomes following non-blast related TBI

- Studies with males (n=33), females (n=16), both (n=9), NR (n=1).
- SNHL more frequently in males (17/33, 56%) than females.
- ❖ Tinnitus and hyperacusis reported for both genders.

Conclusion

- Diffuse nature of TBI/individual variability prevents a definitive framework** for auditory consequences.
- No or inconsistent assessments of tinnitus or hyperacusis limit the available data on these consequences
- Standardised clinical practices and screening guidelines could help manage the burden of TBI more effectively.

References

¹ NICE (2014). *Head Injury Briefing Paper, 77*; ² Arksey, H., & O' Malley, L. (2005). *Int. J. Soc. Res. Methodol.* 8, 19-32.