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The association between traumatic brain injury and hearing loss

Chang, KW; Yang, CC; Kawakami, N; Liou, YK; Hung, Chuang, HY.

Corresponding author:
Chen-Cheng Yang

abcmacoto@gmail.com

Author Affiliation:
Kaohsiung Medical University.

ADMINISTRATIVE INFORMATION

Support - Kaohsiung Municipal Siaogang Hospital.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 July 2026 and was last updated on 12 July 2026.

INTRODUCTION

Review question / Objective The objective of the present study is to conduct a systematic review and meta-analysis to thoroughly investigate the association between traumatic brain injury and hearing loss.

Condition being studied A systematic review and meta-analysis were conducted to investigate the association between traumatic brain injury and hearing loss.
This systematic review and meta-analysis included participants with traumatic brain injury (TBI) and comparison populations without TBI to evaluate the association between TBI and hearing loss.
In this systematic review and meta-analysis, studies including participants with traumatic brain injury (TBI) and comparison populations without TBI were analyzed to assess the association between TBI and hearing loss. We included participants with traumatic brain injury, and a comparison papulation which without traumatic brain injury. The comparison the association between traumatic brain injury and hearing loss.

METHODS

Search strategy Pubmed, Embase, Web of Science
Mesh term: TBI (traumatic brain injury), hearing loss.

Participant or population Participants above 20 years old.

Intervention Participants with TBI.

Comparator Participants without TBI.

Study designs to be included Cohort study, longitudinal study, case-control study.

Eligibility criteria (1) Individuals who have sustained a TBI of any severity.; and (2) The primary outcome of this study is the development

of HL or hearing impairment following TBI. HL is defined using three distinct modalities: objective assessment via pure-tone audiometry (PTA), subjective assessment through self-reported hearing loss or handicap, and clinical identification via administrative diagnostic codes (International Classification of Diseases, ICD), such as ICD-9 or ICD-10.

Information sources Information sources: Electronic databases (e.g., PubMed, Embase, Web of Science, and EMBase) were searched to identify relevant studies. Reference lists of eligible articles and relevant reviews were manually screened to identify additional studies. When necessary, corresponding authors were contacted to obtain missing or unpublished data. Clinical trial registries and grey literature sources were also searched to minimize publication bias.

Main outcome(s) The primary outcome was the association between traumatic brain injury (TBI) and hearing loss. Hearing loss was assessed using audiometric evaluations or clinically confirmed diagnoses, as reported in the included studies. Effect estimates, including odds ratios (ORs), risk ratios (RRs), hazard ratios (HRs), or prevalence estimates with corresponding 95% confidence intervals (CIs), were extracted or calculated for meta-analysis. When available, outcomes were analyzed according to the severity of TBI, type of hearing loss, and duration of follow-up.

Data management The methodological quality and risk of bias of the included studies were independently assessed by two reviewers using appropriate validated tools according to the study design. Any disagreements were resolved through discussion or consultation with a third reviewer. The results of the quality assessment were considered when interpreting the findings of the systematic review and meta-analysis.

Quality assessment / Risk of bias analysis Two reviewers independently assessed the methodological quality and risk of bias of the included studies using the Newcastle–Ottawa Scale (NOS) for observational studies. The NOS evaluates study quality across three domains: selection of study participants, comparability of study groups, and ascertainment of exposure or outcomes. Any disagreements were resolved through discussion, and a third reviewer was consulted when consensus could not be reached.

Strategy of data synthesis Statistical analyses were performed using appropriate R software. Pooled effect estimates with 95% confidence intervals (CIs) were calculated using a random-effects model when substantial heterogeneity was present; otherwise, a fixed-effect model was applied. Heterogeneity among studies was assessed using the I^2 statistic. Where sufficient data were available, subgroup and sensitivity analyses were conducted to explore potential sources of heterogeneity. Publication bias was evaluated using funnel plots and Egger's regression test when at least 10 studies were included. A two-sided P value < 0.05 was considered statistically significant.

Subgroup analysis Subgroup analyses were performed, where sufficient data were available, to explore potential sources of heterogeneity. Subgroups included study design, participant characteristics (e.g., age and sex), severity of traumatic brain injury, type of hearing loss, method of hearing assessment, follow-up duration, and study quality. Differences between subgroups were evaluated using tests for subgroup interaction.

Sensitivity analysis No.

Language restriction English.

Country(ies) involved Taiwan.

Keywords traumatic brain injury, hearing loss, meta-analysis, systematic review, audiological screening.

Contributions of each author
Author 1 - Kai-Wen Chang.
Author 2 - Chen-Cheng Yang.
Author 3 - Norito Kawakami.
Author 4 - Yi-Kuan Liou.
Author 5 - Chih Hsing Hung.
Author 6 - Hung-Yi Chuang.