Association Between Hearing Loss and Disability in Older Adults: a Systematic Review

Presenter: Tzu-Chia Lin
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Background

• Hearing loss (HL) is one of the most common chronic condition among older adults, affecting nearly 80,000 persons aged 65 and above in Taiwan. (Ministry of health and welfare, 2016)

• The deficit affects daily activities and increases the risk of incident disability. (Chen et al., 2014; Lin et al., 2004)

• Previous studies have investigated the association of HL and disability in older adults, but the results are inconsistent. (Chen, Genther, Betz, & Lin, 2014; Gopinath, Schneider, McMahon, Teber, Leeder, & Mitchell, 2011; Laforge & Sternberg, 1992; Lin et al., 2004; Mikkola, Portegijs, Rantakokko, Gagné, Rantanen, & Vujanen, 2015; Rudberg et al., 1993; Tomioka, Okamoto, Morikawa, & Kurumatani, 2015; Yamada, Nishiwaki, Michikawa, & Takebayasbi, 2012)
Background

• Considering disability is a devastating condition in older individuals. Identifying potentially modifiable risk factors such as HI would provide a substantial public health benefit.

• The aim of this review was to comprehensively evaluate the evidence connecting HI to disability in older adults by applying ICF framework.
ICF Model

➢ Bio-psycho-social Model
➢ Functioning and Disability
Literature review

◆ Hearing loss

• HL refers to the physiological age-related changes of the peripheral and central auditory system leading to hearing impairment and difficulty understanding spoken language.

• HL is a sensorineural loss, characterized by symmetrical progressive loss of hearing over many years, and usually affects the high frequencies of hearing. It can also be accompanied by tinnitus, vertigo.
Literature review

Disability

- It denotes the negative aspects of the interaction between an individual (with a health condition) and that individual’s contextual factors (environmental and personal factors).
- It is an umbrella term for impairments, activity limitations and participation restrictions.
Method

◆ Search strategy and information sources

• **Electronic databases**: Airiti library, Cochrane Library, PubMed, Medline, CINAHL, ProQuest, and PsycINFO

• **Mesh subject terms and Keywords**: older adults, senior, elderly, geriatric, aging, ageing, hearing impairment, hearing loss, age-related hearing loss, presbycusis, deaf, hearing handicap, disability, impairment, activity limitation, participation restriction
Method

◆ Study eligibility criteria
  • Inclusion criteria
    ✓ Sample participants ≥65 years.
    ✓ Cross-sectional study or prospective cohort design
    ✓ Confounding factors were reported and controlled.
  • Exclusion criteria
    ✓ Duplicate articles
    ✓ Non-English nor Chinese language publications
    ✓ Lack of a control group

◆ Methodological quality assessment
  • Newcastle Ottawa quality assessment scale (NOS) and JBI
Flow diagram of literature search

- **Electronic database search**
  - Airiti library, Cochrane Library, PubMed, Medline, CINAHL, ProQuest, and PsycINFO
  - n = 791

- **Articles excluded (n = 762)**
  - Not relevant, non-English nor Chinese, Pediatric population, outcome not of interests, non-observational nor experimental study design

- **Title and abstracts reviewed for eligibility**
  - n = 29

- **Articles excluded as duplicates (n = 14)**

- **Full text articles reviewed for eligibility**
  - n = 15

- **Articles included from reference (n = 7)**

- **Abstract or full text articles reviewed for eligibility**
  - n = 22

- **Articles excluded due to full text unavailable (n = 4)**

- **Articles included for analysis**
  - n = 18
Method

Data extraction

- Articles selected for full review had the following information were extracted: authors, country, date of publication, sample size at baseline, demographic information (percentage male, mean age/age distribution), length of follow-up, measurement and definition of HL, measurement and definition of disability, and percentage of sample who sustained the disability outcome.
### Result

- **Quality assessment for cohort studies**

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<td>3. Ascertainment of exposure</td>
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<td>4. Demonstration that outcome of interest was not present at start of study</td>
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<td>6. Assessment of outcome</td>
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<td>7. Was follow-up long enough for outcomes to occur</td>
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<td>8. Adequacy of follow up of cohorts</td>
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## Result

- Quality assessment based on JBI critical appraisal checklist for analytical cross-sectional studies

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Result

Studies Included in the Review

- Date of publication: 1993-2016
- Country: USA, Finland, UK, Italy, Australia, and Japan
- Sample size at baseline: 434-9447 participants
- Length of follow-up: 1 – 10 years
- HL prevalence: 19.9% to 69.3%
  - Some or mild HL: 32.5% to 52.6%
  - Moderate or greater HL: 10% to 50.4%
Result

Measurement of HI

- Objective: pure tone audiometry (5)
  - Standard: WHO (3), American Speech-Language Hearing Association guideline (1)
- Subjective: self-report questionnaire (12)
- Objective and subjective (1)
Result

<table>
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<th>Outcome measured</th>
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<tr>
<td><strong>Impairment</strong></td>
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<tr>
<td>• Maximal walking speed</td>
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<td>• Walking difficulties</td>
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<td>• Mobility limitation</td>
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<td>• Physical functioning</td>
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<tr>
<td><strong>Activity limitation</strong></td>
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<tr>
<td>• ADL &amp; IADL</td>
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<tr>
<td>• Physical activity</td>
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<tr>
<td>• Activity limitation</td>
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<td><strong>Participation restriction</strong></td>
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<tr>
<td>• Time spent out of home</td>
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<tr>
<td>• Withdraw from leisure activity</td>
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<tr>
<td>• Participation in social or/and leisure activities</td>
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</table>
Result

The association between HL and impairment

- Walking difficulties: participants with HL at baseline had higher risk of new major difficulties in walking 2km as those without HL.
- Physical functioning: HL is associated with poorer objective physical functioning, comparing with individuals with normal hearing.
- Mobility limitation: inconclusive result.
  - participants different in age, gender, social engagement
  - more social engagement, stronger motivation of maintaining physical function, lower risk of being disability.
The association between HL and activity limitation

- ADL: inconclusive results in cross-sectional and cohort studies.
  - Cohort effect or interindividual heterogeneity

- IADL: inconclusive results in cohort studies.
  - A meta-analysis was performed and pooled effect estimates across two studies.
  - Hearing loss was associated with 1.86 times greater odds of declining in IADL (Pooled OR = 1.86, 95% CI = 1.46-2.35).
Result

The association between HL and participation restriction

- Participation in social or/and leisure activities: HL was NOT associated with greater odds of social and leisure activities restriction.

- Social role: inconclusive results in cohort studies.

  ✓ Hearing loss was associated with 1.71 times greater odds of declining in social role (Pooled OR = 1.71, 95% CI = 1.38-2.12).
Conclusion

• With increasing longevity, HL will dramatically influence the lives of millions of older people.

• There are many negative impacts result from HL and these include physiological, psychological, behavioral, family and social aspects.

• The rehabilitation needs for the elderly with hearing loss should not be only limited in hearing aid use, but also client empowerment, integrated the significant others in the rehabilitation programmes, implementing the rehabilitation programme closer to the elderly's daily environment.
Thank you

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