



PREDICTORS OF LATE-ONSET AUDITORY DEPRIVATION IN ELDERLY MONAURAL HEARING AID USERS: A 12-MONTH PROSPECTIVE STUDY

Audiology

**Bhowmick
Kandpal**

Ph.D. Scholar, Department Audiology & Speech Language Pathology, Shri Khushal Das University, Hanumangarh.

**Prof. (Dr.) Vakil
Prasad Sah**

Professor, Department Audiology & Speech Language Pathology, Shri Khushal Das University, Hanumangarh

ABSTRACT

Late-onset auditory deprivation is a well-documented phenomenon in monaural hearing aid users, characterized by declining speech recognition abilities in the unaided ear. This study aimed to identify baseline predictors of auditory deprivation severity in elderly monaural hearing aid users over a 12-month period. Eighty-six elderly adults (aged 60-80 years) with bilateral sensorineural hearing loss fitted with monaural hearing aids were prospectively followed for 12 months. Speech discrimination scores (SDS) were measured at baseline and 12-month follow-up. Participants were categorized into significant deprivation ($\geq 6\%$ decline, $n=44$) and mild deprivation ($< 6\%$ decline, $n=42$) groups. The mean SDS decline was 5.16% (SD=1.90) over 12 months, with 51.2% experiencing significant deprivation. Baseline SDS showed a trend-level negative correlation with deprivation magnitude ($r=-0.205$, $p=0.058$). Lower baseline speech discrimination ability may be a risk factor for more severe auditory deprivation in monaural hearing aid users.

KEYWORDS

auditory deprivation, monaural hearing aids, speech discrimination, predictors, elderly

INTRODUCTION

Late-onset auditory deprivation refers to the progressive decline in speech recognition abilities observed in the unaided ear of patients fitted with a single hearing aid for bilateral sensorineural hearing loss. First described by Silman and colleagues in 1984, this phenomenon demonstrates that the auditory system requires consistent stimulation to maintain optimal function (Silman et al., 1984). The clinical significance extends beyond audiological metrics, as patients experiencing significant deprivation may face challenges if they later require amplification in that ear (Silverman & Silman, 1990). This study aimed to examine baseline predictors of auditory deprivation severity in elderly monaural hearing aid users.

METHODS

This prospective, longitudinal study was conducted at audiological rehabilitation centers in North India. Eighty-six elderly adults (54 males, 32 females) with bilateral symmetrical sensorineural hearing loss completed the 12-month follow-up. Inclusion criteria were: age ≥ 60 years, bilateral symmetrical sensorineural hearing loss (PTA > 40 dB HL), first-time monaural hearing aid fitting, and no prior amplification experience.

Auditory deprivation was quantified as the change in Speech Discrimination Score (SDS) in the unaided ear from baseline to 12-month follow-up, measured using phonetically balanced word lists. Participants were categorized as Significant Deprivation ($\geq 6\%$ decline) or Mild Deprivation ($< 6\%$ decline). Baseline predictors examined included age, Pure Tone Average (PTA), baseline SDS, and daily hearing aid usage. Pearson correlation and independent samples t-tests were used for analysis.

RESULTS AND DISCUSSION

The study sample had a mean age of 67.56 years (SD=5.52, range 60-80), mean baseline PTA of 68.11 dB HL (SD=9.30), and mean baseline SDS of 54.56% (SD=10.58). Mean daily hearing aid usage was 6.18 hours (SD=1.82).

Over 12 months, the unaided ear showed a mean SDS decline of 5.16% (SD=1.90, range 2-10%). All participants experienced some decline. Based on the 6% threshold, 44 participants (51.2%) were categorized as having significant deprivation, while 42 (48.8%) experienced mild deprivation (Table 1).

Table 1: Distribution Of Auditory Deprivation Severity

Deprivation Category	Participants	Percentage
Mild ($< 6\%$ decline)	42	48.8%
Significant ($\geq 6\%$ decline)	44	51.2%

Bivariate correlations showed baseline SDS had a trend-level negative correlation with deprivation magnitude ($r=-0.205$, $p=0.058$). Age

($r=0.086$, $p=0.429$), PTA ($r=0.074$, $p=0.497$), and daily usage hours ($r=0.040$, $p=0.716$) were not significantly correlated with deprivation severity (Table 2).

Table 2: Correlations Between Predictor Variables And SDS Decline

Predictor Variable	Pearson r	p-value
Age	0.086	0.429
PTA Baseline (dB HL)	0.074	0.497
SDS Baseline (%)	-0.205	0.058
Daily Usage (hours)	0.040	0.716

Participants with significant deprivation had lower baseline SDS (52.50% vs. 56.71%, $p=0.068$) compared to those with mild deprivation. No significant differences were observed for age ($p=0.954$), PTA ($p=0.429$), or daily usage hours ($p=0.426$).

This prospective study examined baseline predictors of late-onset auditory deprivation in elderly monaural hearing aid users. The primary finding was that baseline speech discrimination ability showed a trend-level association with deprivation severity, suggesting patients with poorer initial SDS may be at higher risk for significant deprivation.

The observed mean SDS decline of 5.16% over 12 months is consistent with previous literature (Silman et al., 1984). The fact that all participants experienced some degree of decline underscores the pervasive nature of this phenomenon and reinforces the "Use It or Lose It" principle.

The lack of association between daily hearing aid usage and deprivation severity suggests that the deprivation effect in the unaided ear is primarily driven by the absence of stimulation rather than the amount of stimulation received by the aided ear. This reinforces the clinical recommendation for binaural amplification whenever feasible. Study limitations include the sample size and 12-month follow-up period, which may not capture longer-term trajectories. Future research should incorporate cognitive measures that might mediate the relationship between baseline function and deprivation severity.

CONCLUSION

This study examined predictors of late-onset auditory deprivation in elderly monaural hearing aid users. While all participants experienced some degree of decline, baseline speech discrimination ability showed a trend-level association with deprivation severity. Patients with poorer initial speech understanding may be at higher risk for significant deprivation. These findings support clinical recommendations for binaural amplification and highlight the importance of counseling patients about the risks of monaural fitting for bilateral hearing loss.

REFERENCES

1. Hurley R. M. (1998). Is the unaided ear effect independent of auditory aging?. *Journal of the American Academy of Audiology*, 9(1), 20–24.
2. Silman, S., Gelfand, S., & Silverman, C. (1984). Late-onset auditory deprivation: effects of monaural versus binaural hearing aids.. *The Journal of the Acoustical Society of America*, 76 5, 1357-62. <https://doi.org/10.1121/1.391451>
3. Silverman, C. A., & Silman, S. (1990). Apparent auditory deprivation from monaural amplification and recovery with binaural amplification: two case studies. *Journal of the American Academy of Audiology*, 1(4), 175–180.
4. Wilmington, D., Gray, L., & Jahrsdoerfer, R. (1994). Binaural processing after corrected congenital unilateral conductive hearing loss. *Hearing research*, 74(1-2), 99–114. [https://doi.org/10.1016/0378-5955\(94\)90179-1](https://doi.org/10.1016/0378-5955(94)90179-1)
5. Yoon, Y. S., Li, Y., & Fu, Q. J. (2012). Speech recognition and acoustic features in combined electric and acoustic stimulation. *Journal of speech, language, and hearing research : JSLHR*, 55(1), 105–124. [https://doi.org/10.1044/1092-4388\(2011/10-0325\)](https://doi.org/10.1044/1092-4388(2011/10-0325))