

RESEARCH LETTER

Prevalence of Age-Related Hearing Loss in Older Adults: Blue Mountains Study

A recent article in the *Archives* investigated the prevalence of hearing loss among US adults aged 20 to 69 years, based on data from the National Health and Nutrition Examination Survey (NHANES, 1999-2004).¹ A hearing loss prevalence of 16.1% was observed in this study. In addition, associations between demographic characteristics, noise exposure, cardiovascular risk factors, and hearing loss were assessed. Potential associations between the severity of hearing loss and the described risk factors were not explored. We aimed to confirm the associations between severity of hearing loss and the risk factors assessed by Agrawal et al¹ and to compare our prevalence findings with theirs.

Methods. The Blue Mountains Eye Study (BMES) is a population-based cohort study of sensory loss and other health outcomes. Ascertainment and survey methods were reported.² During 1992 through 1994, 3654 participants 49 years or older were examined (82.4% participation rate). Surviving baseline participants were invited to attend 5- and 10-year follow-up examinations, at which 2335 (75.1% of survivors; 543 had died) and 1952 (75.6% of survivors; 1103 had died) participants were reexamined, respectively. During 1997 through 2000, 2956 persons 50 years or older had audiometric testing performed. At face-to-face interviews with trained interviewers, a comprehensive medical history and information about hearing and socioeconomic and lifestyle factors were obtained from all participants.

An audiologist asked additional questions including history of any self-perceived hearing problem, including its severity, onset, and duration. Other questions addressed occupational noise exposure. Pure-tone audiometry at both visits was performed by audiologists in sound-treated booths. Hearing impairment was determined as the pure-tone average (PTA) of audiometric hearing thresholds at 500, 1000, 2000, and 4000 Hz (PTA_{0.5-4.0kHz}), defining any hearing loss as a PTA_{0.5-4.0kHz} greater than 25 dB HL (hearing level) and moderate to severe hearing loss as a PTA greater than 40 dB HL in the better ear. This defined hearing loss as bilateral.

Results. Of the 2956 participants, detailed audiometric data were available for 2940 subjects. Any level of hearing loss (PTA_{0.5-4.0kHz} >25 dB HL) was present in 33.0% of participants. Age-related hearing loss was more prevalent in men than in women for each decade younger than 80 years (age-adjusted odds ratio [OR], 1.7 [95% confidence interval, 1.4-2.0]). The prevalence of any hearing loss doubled for each age decade (OR, 3.5 [95% confidence interval, 3.1-3.9]). We observed bilateral hearing loss in 17.0% of women and 28.7% of men aged 60 to 69 years. Statistically significant associations between the same risk factors as described by Agrawal et al¹ and hearing loss were observed in our study. History of working in a noisy environment was associated with a 70% and 90% increased likelihood of any and moderate to severe hearing loss, respectively (**Table**). A non-significant association between hypertension and any hearing loss was observed but was marginal with increasing hearing loss severity (Table).

Comment. Agrawal et al¹ reported prevalent bilateral hearing loss in 43% and 20% of men and women aged 60 to 69 years, respectively. We found comparable, but slightly lower hearing loss prevalences of 28.7% and 17.0% in men and

Table. Multivariable Model of Risk Factors for Any and Moderate to Severe Hearing Loss

Risk Factor	Patients With Factor, %	OR (95% CI)	
		Any Hearing Loss (>25 dB HL)	Moderate to Severe Hearing Loss (>40 dB HL)
Age, y (per decade)			
50-59	23.7	1 [Reference]	1 [Reference]
60-69	35.1	3.4 (2.4-4.7)	4.8 (2.3-10.4)
70-79	30.4	12.0 (8.6-16.9)	17.9 (8.5-38)
≥80	10.8	50.7 (33.2-78.9)	148.1 (66.5-325.0)
Male	43.2	1.4 (1.1-1.7)	1.5 (1.1-2.1)
Current smoker	9.7	1.5 (1.0-2.0)	1.2 (0.7-2.1)
Noise exposure at work	36.8	1.7 (1.3-2.1)	1.9 (1.3-2.6)
>High school education	64.3	0.8 (0.6-1.0)	0.7 (0.5-0.9)
Type 2 diabetes mellitus ^a	9.9	1.4 (1.0-1.8)	1.6 (1.0-2.5)
Hypertension ^b	76.9	1.2 (0.9-1.5)	1.5 (1.0-2.2)

Abbreviations: CI, confidence interval; HL, hearing level; OR, odds ratio.

^aDiabetes was defined either by self-reported history of physician-diagnosed diabetes or by fasting blood glucose level of 126 mg/dL or greater (to convert to millimoles per liter, multiply by 0.0555).

^bHypertension was defined using International Society of Hypertension guidelines.³

women, respectively, but observed a similar near exponential increase in hearing loss with age. In agreement with NHANES data, hearing loss prevalence increased significantly with age and was greater in men than in women. Apart from hypertension, we confirm all associations between potential risk factors and any level of hearing loss as reported by Agrawal et al.¹ Furthermore, these associations were marginally stronger (except for smoking) for more severe levels of hearing loss. Thus, we concur with Agrawal et al¹ that focusing on modifiable risks may help to reduce the prevalence of age-related hearing loss. In conclusion, data from both the BMES and NHANES highlight the burden imposed by untreated and/or underrecognized hearing loss and indicate the need for possible strategies to eliminate preventable hearing loss.

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COMMENTS AND OPINIONS

Care Quality and Frail Subjects

We read with interest the editorial titled "Improving Care Quality and Reducing Disparities,"¹ and we would like to comment, adding peculiar focus on "unequal treatment" given to very old, frail subjects.

At present, elderly persons may be considered members of a minority population even if their numbers are

reaching levels much higher than other groups (eg, black, poor, or disabled subjects). The crucial points are, from one side, clinical prejudices against old age and, from the other side, the lack of convincing studies transferring scientific evidence to the real-world conditions of very old subjects, characterized by comorbidity and disability (and very often also by a reduced cognitive function).

To overcome the gap, it could be important to produce public reports on clinical performances (starting from the most easily demonstrable events, eg, the rate of cataract removal or hip prosthesis implantation in subjects with dementia), although the demonstration of outcomes is far more difficult in elderly subjects. These reports would be extremely useful for clinicians in establishing control conditions for their work and assuring a high level of care for the most frail, elderly subjects, thus reducing disparities in their access and quality of care.

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A Ray of Sunshine for the Vitamin D-Heart Hypothesis

We suggest that the observation by Giovannucci et al,¹ linking higher plasma 25-hydroxyvitamin D concentrations to lower myocardial infarction risk in men, bears fewer discrepancies with existing literature than the authors presume. The authors note that their observational findings disagree with the findings from the largest randomized trial of vitamin D, the Women's Health Initiative (WHI) study, in which the vitamin D + calcium group exhibited no benefit—nor trend to benefit—against myocardial infarction (hazard ratio, 1.04; 95% confidence interval, 0.92-1.18).²

We propose that this difference may arise, not primarily from the relatively low vitamin D dose of 400 IU/d, as the authors suggest, but from the inclusion of calcium with vitamin D supplementation in the WHI: a recent double-blind randomized controlled trial in postmenopausal women reported an apparent increase in myocardial infarction incidence in those randomized to calcium (as calcium citrate) vs placebo.³ Moreover, in a meta-analysis of randomized trials identifying a benefit of vitamin D supplementation against all-cause mortality, only 2 vitamin D trials differed in the direction of effect from the benefit found overall: both of these trials combined vitamin D with calcium supplementation.⁴ Thus, the supplemental calcium in the vitamin D arm of WHI could be speculated to countermand its cardiac benefits, rendering findings across these several studies wholly compatible.