Noise Induced Hearing Loss

Keith T Palmer et al. Occupational exposure to noise and hearing difficulties in Great Britain. Contract Research Report 361/2001

Summary
The objectives of this research were to determine the prevalence of self-reported hearing difficulties and tinnitus in working-aged people from the general population, and to estimate the risks from occupational exposure to noise and the number of attributable cases nationally.

A questionnaire was mailed to 22 194 adults of working age selected at random from the age-sex registers of 34 British general practices (21 201 subjects) and from the central pay records of the British armed services (993 subjects). (An overall response rate of around 60% among those who could be contacted).

Information was collected on years of employment in a noisy job; and whether the respondent wore a hearing aid, had difficulty in hearing conversation, or had persistent tinnitus over the past year.

Some 2% of subjects reported severe hearing difficulties (wearing a hearing aid or having great difficulty in both ears on hearing conversation in a quiet room). In men, the prevalence of this outcome rose steeply with age, from below 1% in those aged 16-24 years to 8% in those aged 55-64.

The pattern was similar in women, but with severe hearing loss was only about half as prevalent in the oldest age band. In both sexes, after adjustment for age, the risk of severe hearing difficulty and persistent tinnitus rose with years spent in a noisy job.

Tinnitus was far more common in subjects with hearing difficulties.

Numerical results
In men with at least 10 years of high occupational noise exposure, the adjusted prevalence ratio (PR) for severe hearing difficulty was 3.8 (95%CI = 2.4-6.2) and that for persistent tinnitus 2.6 (95%CI = 2.0 - 3.4) in comparison with men who had never had occupational exposure to noise. Both figures are adjusted for age.

Attributable fraction, for those men aged 35 to 64 inclusive:

- ❏ Moderate or worse hearing: 58.0%
  95% CI = (44% to 71%)

- ❏ Severe hearing difficulty: 50.5%
  95% CI = (29% to 71%)

- ❏ Persistent tinnitus: 36.0%
  95% CI = (23% to 48%)

- ❏ Severe hearing difficulty or persistent tinnitus or both: 39.8%
  95% CI = (26% to 51%)

Attributable fraction is calculated from:

$$\frac{p(PR-1)}{1+p(PR-1)}$$

where:
PR = prevalence ratio of hearing difficulty (or tinnitus) in a given exposure band compared with those in the lowest band (never exposed occupationally).

p = standardised estimate of the prevalence of having worked in a noisy occupation in the population of Great Britain.

The levels of hearing were not independently assessed by audiogramme but a similar study found moderate or worse hearing difficulties were found on the average to correspond with a hearing loss of 45 dB (A) and to this extent the levels of difficulty reported are likely to be material and clinically significant.

In numerical terms: 153,000 men this age band were estimated to have attributable severe hearing difficulty; 266,000 men were estimated to have attributable persistent tinnitus.

Comment

Noise exposure at work continues to cause significant impairment, especially in the 35 to 64 yr age group.

In statistical terms, an attributable fraction of 50% or more provides confirmation that the outcome of interest (for example in this case severe hearing difficulty) has, on the balance of probabilities, a significant contribution from the exposure in question (high occupational noise). This result applies to men (aged between 35 and 64 inc.) selected at random from the general population and is highly dependent of the value of p.

The results suggest that the probability of persistent tinnitus and, combined severe hearing difficulty/persistent tinnitus both fall below the threshold required for the balance of probabilities. They also suggest that otologists should suspect that severe hearing difficulty in men in the 35 to 64 yr. age group, has a contribution from occupational noise.

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