Neurological Impairment from Hand–Arm Vibration Exposure

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Background

• hand–arm vibration are known to cause vibration white fingers, neurosensory injury and carpal tunnel syndrome (CTS)
• there is limited knowledge of the LOEL for hand–arm vibration induced disease
• it's important to know at what level of vibration you can expect harmful effects in cases with workers compensation claims or for preventive work
• in our earlier study we found a relation between the level of exposure and the occurrence of carpal tunnel syndrome, using a JEM based exposure calculation
• the aim of the present study is to investigate neurological impairment or neuropathic symptoms in relation to HAV exposure, using a JEM
Methods

• case-control study
• the material was derived from another study that consist of 441,744 subjects
• the original register excluded following diagnoses: seropositive rheumatoid arthritis (M05), other arthritis (M06), ankylosing spondylitis (M45), Crohn’s disease (K50), ulcerative colitis (K51) or sarcoidosis (D86)
• 1623 cases of paresthesia (ICD-10 R20.2 paresthesia of skin) was identified by using National Board of Health and Welfare (SoS) outpatient register for specialised care

  • all cases was matched to one control by sex, age and county of residence
Methods

- data on occupational codes and employment time were derived from Statistics Sweden (SCB) occupational register.
- An estimation of individual HAV exposure was done by using a JEM to evaluate employment time, level of exposure in different occupations.
- Mean yearly exposure was stratified into groups of 0, 0.01–2.5, and >2.5 m/s² per year.
- Cumulative exposure of HAV was stratified into groups of 0, 0.01–2.03, 2.04–9.07, and >9.08 m/s².
- Conditional logistic regression was used to calculate the odds ratio (OR) for HAV exposure between cases and controls.
Results

- 1623 cases with paresthesia of skin (R20.2) with a matched control for each case
- cases had 2.9 year of exposure before diagnosis and both higher cumulative and mean yearly exposure

TABLE 1. Baseline Characteristics of the Study Participants with Paresthesia’s of skin and the Matching Control Group

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<th></th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Deviation</th>
<th>Min.</th>
<th>Max.</th>
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<td>20.0</td>
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<td>Cases</td>
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<td></td>
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<tr>
<td>Women</td>
<td>Controls</td>
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<td>Age at cases diagnosis (years)</td>
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<tr>
<td>Years with exposure prior to diagnosis</td>
<td>Controls</td>
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<td>1623</td>
<td></td>
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<tr>
<td>Cumulative exposure</td>
<td>Controls</td>
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<td>0.4</td>
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<td>1623</td>
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</table>
Results

- no relationship between paresthesia and mean yearly occupational vibration exposure

- statistically significant relationship between paresthesia and the highest exposed group measured as cumulative exposure OR 1.37 (CI 1.04-1.81)

- significant increase for men in the highest exposed group measured as cumulative exposure OR 1.4 (CI 1.02-1.90) but not for women.
Conclusions

- significantly increase of paresthesia of the skin was found when cumulative exposure was above 9.08 m/s^2 for both the total group and for men
- the findings indicate that >3 year of exposure at a level equal to the action limit (2.5 m/s^2) is enough to increase the risk for paresthesia
- limitation: ICD-10 code R20.2 also includes paresthesia in feet which could alter the results
Authors

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