SHORT REPORT

Prevalence of upper limb disorders among female librarians

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Background
Work as a librarian involves exposure to potential risk factors for developing upper limb disorders. The prevalence of upper limb symptoms has, however, not previously been assessed in this occupational group.

Aims
To estimate the 7-day and annual prevalence of self-reported neck and upper limb symptoms in librarians and to examine associations with specific tasks and ergonomic risk factors.

Methods
A cross-sectional study using components of the standardized Nordic questionnaire. The study population consisted of librarians employed by a large local authority, and data collection was by means of a self-administered questionnaire. Results from studies on keyboard workers and on the general population were used as comparators.

Results
The 7-day prevalence of self-reported neck and upper limb pain in female librarians was 42% (95% confidence interval 33.7–50.5) and the annual prevalence was 65% (95% CI 56.6–72.8). The prevalence of reported wrist and hand pain increased with increased working involving a wide thumb–index span ($P < 0.05$) with a significant linear trend in prevalence with increasing exposure ($P < 0.01$). There was a strong association between reporting hand and/or wrist pain and awareness of work-related upper limb disorder ($P < 0.05$).

Conclusions
The annual prevalence of self-reported upper limb symptoms among female librarians was high, but there was insufficient evidence to confirm whether the prevalence was higher than in the general population or among keyboard workers. Working with a wide thumb–index span was associated with reporting upper limb symptoms.

Key words
Librarians; upper limb disorders; wide thumb–index span; wrist pain.

Introduction
Musculoskeletal disorders affecting the upper limb are a source of concern. Data from the UK Labour Force Survey on self-reported work-related illness in 2011/2012 suggest musculoskeletal disorders were among the most common self-reported work-related conditions [1]. Both physical and non-physical occupations are implicated with high rates of reported upper limb disorder in a range of occupations from construction to office work [2,3]. An in-depth review by Wahlstrom identified physical load factors as risk factors for musculoskeletal symptoms [4], and there is also increasing evidence that cultural and workplace psychosocial risk factors play a role in the development of upper limb disorders [5,6].

The traditional work of librarians involves handling books. Typical duties include collecting, shelving, scanning and delivering books. Interlibrary loans require books to be packed and unpacked from large boxes. A wide thumb–index finger span (the distance between thumb and index finger) may be required to handle large books or when several books are handled at a time. Librarians may also work with their arms outstretched to reach high shelves.

This study was undertaken in view of the high number of reported upper limb symptoms among librarians observed in the author’s clinical practice, since a literature search did not identify any previous studies.

Methods
A cross-sectional study was undertaken using components of the standardized Nordic questionnaire (available as
The study group consisted of 368 librarians working in 39 libraries employed by a local authority in one British county. All libraries were included in the study and were visited by the author to brief managers about the study and to distribute the questionnaire to staff. Information collected included duration of work with hands above shoulder level, with arms outstretched, with wide thumb–index span and shelving and scanning books. To assess subjects’ prior awareness of upper limb disorders, one of the questions asked was ‘Have you ever heard or read about repetitive strain injury (RSI), work-related upper limb disorder (WRULD), or cumulative trauma syndrome (CTS)?’.

For comparison, results from studies of the prevalence of upper limb symptoms among keyboard workers and the general population were used [8,9]. Data were analysed using SPSS version 14. The Mann–Whitney U-test was used for two group comparisons and the Kruskal–Wallis test was used for more than two group comparisons.Associations with potential risk factors were analysed using the chi-square test or Fisher’s exact test.

The National Research Ethics Service advised this study did not need formal ethical approval under the National Health Service research governance arrangements.

### Results

A valid response was received from 146 librarians (40%). Eighty-nine per cent (130) were female librarians. Male librarians were therefore excluded from the analysis. Thirty-eight per cent of the librarians were aged from 50 to 59 years. More than 50% carried out ‘risk activities’ for less than 2 h on an average working day (Table 1).

In female subjects, the prevalence of self-reported pain in neck and upper limb in the past 7 days was 42% (95% confidence interval (CI) 33.7–50.5). Site-specific prevalence rates were neck 24% (95% CI 17.2–32.1), shoulder 19% (95% CI 12.8–26.2), elbow 7% (95% CI 3.7–12.7) and hand or wrist 23% (95% CI 16.8–31.3). The prevalence was similar to that found in keyboard workers (Table 2).

The annual prevalence of symptoms among female subjects was 65% (95% CI 56.6–72.8). Site-specific prevalence rates were neck 46% (95% CI 35.9–52.8), shoulder 38% (95% CI 27.2–43.4), elbow 13% (95% CI 8.4–20.1) and hand or wrist 36% (95% CI 27.2–43.4).

Age, years in employment, scanning and shelving were not significantly associated with reporting upper limb symptoms.

There was significant difference in the prevalence of wrist or hand pain and working less or more than 2 h daily with arms outstretched (P < 0.05). There was a significant linear trend relationship between time spent working with a wide thumb–index span and reporting hand or wrist pain (P < 0.01).

None of those who had not heard of RSI, WRULD or CTS reported wrist or hand pain, whereas the prevalence of wrist or hand pain was 39% in those who had heard of these terms. This difference was statistically significant (P < 0.05).

### Discussion

This survey identified a high annual prevalence (65%) of self-reported neck or upper limb symptoms among librarians. The key predictors of upper limb symptoms were increased duration of working with wide thumb–index span or with arms outstretched. Hand or wrist pain was more prevalent in those who were aware of the terms RSI, WRULD and CTS.

Limitations of this study include the self-estimation of exposure to occupational activities and the low response rate. However, as the main focus of the study was internal comparison among librarians, it is unlikely that an increased response rate would have significantly altered the findings on association, but may have influenced prevalence estimates. Due to the non-parametric nature of the data, it was not possible to carry out formal analysis to look at associations adjusted for age. Another limitation of the study was that defining a thumb–index span, since it was not possible to quantify this in a study based on self-reports.

A strength of the study was that a sufficient number of librarians participated as calculated by the statistical power analysis. The comparison of exposure and work activity was done within the cohort of female librarians and internal comparisons of this kind have the advantage of eliminating confounders.

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**Table 1.** Female librarians carrying out potential risk activities per working day

<table>
<thead>
<tr>
<th>Risk activity</th>
<th>None, n (%)</th>
<th>&lt;2 h, n (%)</th>
<th>2–4 h, n (%)</th>
<th>&gt;4 h, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arms above shoulder level</td>
<td>6 (5)</td>
<td>95 (74)</td>
<td>20 (16)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>Arms outstretched</td>
<td>5 (4)</td>
<td>76 (59)</td>
<td>31 (24)</td>
<td>13 (10)</td>
</tr>
<tr>
<td>Wide thumb–index span</td>
<td>18 (14)</td>
<td>69 (54)</td>
<td>21 (16)</td>
<td>17 (13)</td>
</tr>
<tr>
<td>Shelving</td>
<td>9 (8)</td>
<td>65 (50)</td>
<td>47 (36)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>Scanning</td>
<td>7 (5)</td>
<td>34 (26)</td>
<td>50 (39)</td>
<td>35 (27)</td>
</tr>
</tbody>
</table>

**Table 2.** Association of neck and upper limb symptoms (7-day prevalence) with keyboard work and librarian activities in women

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Female keyboard workers [8] (%)</th>
<th>Female librarians (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>1036</td>
<td>130</td>
</tr>
<tr>
<td>Wrist or hand pain</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>Elbow pain</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Shoulder pain</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Neck pain</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>

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**Supplementary data** at *Occupational Medicine* Online) [7].
The prevalence of symptoms was similar to that found in a study on female keyboard workers [8] with a marginally higher rate of reported wrist and hand pain among librarians. However, the prevalence of upper limb symptoms was lower than in a general population study [9], although the latter study also included male subjects.

It was difficult to compare the apparent impact of work with a wide thumb–index span in this study with other groups as there is no evidence base available for comparison. This risk factor may warrant further investigation as it might be reduced or avoided if librarians’ book handling techniques were to be altered.

Key points
• In this study, almost two-thirds of female librarians reported neck and upper limb symptoms in the last year.
• Working with a wide thumb–index span was associated with reporting hand or wrist pain.
• Librarians who had heard of repetitive strain injury, work-related upper limb disorder or cumulative trauma syndrome were more likely to report upper limb symptoms.

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Conflicts of interest
None declared.

References