Research Symposium – Thursday 8 November 2012

North West Adelaide Health Study - Musculoskeletal

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School of Medicine, Faculty of Health Sciences
Introduction

- Musculoskeletal pain significant in the population
- Limited cross-sectional and longitudinal data from cohort studies
- Opportunity for factors to be examined in detail
Musculoskeletal data

Stage 2

- Have you ever had pain, aching, stiffness on most days for more than a month in the:
  - Feet
  - Hands
  - Back
  - Knees
  - Hips
  - Shoulders
Musculoskeletal data

- Have you ever been told by a doctor that you have:
  - Arthritis
  - Osteoporosis
- Fracture as a result of fall from standing height
- Shoulder range of movement, grip strength, hand photos
- DXA scans
Musculoskeletal data

Stage 3

- Have you had pain, aching, stiffness on most days for at least a month in the:
  - Feet
  - Hands
  - Back
  - Knees
  - Hips
  - Shoulders
Musculoskeletal data

- Grip strength
- Have you ever been told by a doctor that you have:
  - Arthritis
  - Osteoporosis
  - Gout
## Results - Prevalence Stage 2

<table>
<thead>
<tr>
<th>Joint</th>
<th>Prevalence (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back</td>
<td>34.9</td>
<td>(33.3-36.5)</td>
</tr>
<tr>
<td>Shoulder</td>
<td>22.3</td>
<td>(20.9-23.7)</td>
</tr>
<tr>
<td>Knee</td>
<td>16.0</td>
<td>(14.8-17.3)</td>
</tr>
<tr>
<td>Foot</td>
<td>15.0</td>
<td>(13.8-16.2)</td>
</tr>
<tr>
<td>Hand</td>
<td>13.7</td>
<td>(12.6-14.9)</td>
</tr>
<tr>
<td>Hip</td>
<td>9.5</td>
<td>(8.6-10.5)</td>
</tr>
</tbody>
</table>
Results - Hands

- Hand pain in Stage 2 associated with:
  - Females
  - Older age
  - Lower education level*
  - Sedentary*
  - Obesity*
  - Diabetes*
  - Shoulder, hip, knee, foot†

*adjusted for age and sex; †adjusted for age, sex, BMI
Cole et al; Scand J Rheum, 2011
Results - Hands

- Grip strength assessment
- Higher grip strength associated with higher BMI in those under 30 years and over 70 years
- Inversely related to BMI between these ages
- Grip strength values lower than international convenience samples

Masey-Westropp et al; BMC Research Notes, 2011
Results - Feet

- Foot pain in Stage 2 associated with:
  - Females
  - Older age
  - Obesity*
  - Hip*
  - Knee*
  - Back*

*adjusted for age and sex
Hill et al; J Foot Ankle Res, 2008
Results - Feet

- Use of podiatry services examined

- Overall, 9.5% of the total sample and 17.7% of those who reported foot pain had attended a podiatrist in the past year

- Accessed podiatry treatment more likely to be female, aged over 45 years, obese, and have major chronic medical conditions (osteoporosis, arthritis, diabetes, cardiovascular disease and high blood pressure)

- Those who reported foot pain but had not accessed a podiatrist were more likely to be male and be aged 20 to 34 years

Menz et al; J Foot Ankle Res, 2008
Results - Feet

- Explore age and gender differences in the proportion of people with disabling foot pain using three different case definitions of the Manchester Foot Pain and Disability Index (MFPDI)

- A random sample of 223 participants aged 27 to 90 years (88 males and 135 females)

- The proportion of people with disabling foot pain according to each definition was as follows: Definition A (100%), Definition B (95.1%) and Definition C (77.6%)

Menz et al; BMC Musculoskeletal Disorders, 2011
Results - Feet

- Age significantly affected both the pain intensity and functional limitation items, with younger people more likely to report their foot pain being worse in the morning, and older people more likely to report functional limitations.

- Women were more likely report functional limitations than men.

Menz et al; BMC Musculoskeletal Disorders, 2011
Results - Shoulder

- Shoulder pain in Stage 2 associated with:
  - Females
  - Older age
  - Lower education level*
  - Obesity*
  - Smoking*
  - Sedentary*

*adjusted for age and sex
Hill et al; Int J Rheum Dis, 2010
Results - Shoulder

- Those with diabetes had higher prevalence of shoulder pain/stiffness (27.39% vs. 21.3%, p=0.025)
- After adjustment for age, sex, obesity, smoking prevalence was not significantly different
- Range of movement significantly reduced in those with diabetes

Cole et al; J Rheum, 2009
Results - Shoulder

- Validation of the Shoulder Pain and Disability Index (SPADI) in a population sample using principal components factor analysis
- The internal consistency of the SPADI subscales were high (Cronbach’s alpha > 0.92)
- Two factors, explaining 61.4% of the total variance were extracted - disability and pain

Hill et al; BMC Musculoskelet Disord 2011
Results - Shoulder

- There was a strong negative correlation between SPADI disability subscale scores and shoulder range of motion
- SPADI disability, but not pain, subscale scores were correlated with age

Hill et al; BMC Musculoskelet Disord 2011
Results - Shoulder

- Examined leisure time physical activity and shoulder pain
- Of the 1502 working participants, 16% reported having current shoulder pain
- Shoulder pain associated with older age (OR 1.98, 95% CI: 1.31–2.99), smoking (OR 1.44, CI: 1.02–2.04), secondary-level educational attainment (OR 1.68, 95% CI: 1.07–2.65), high BMI (OR 1.54, 95% CI: 1.14–2.08) and depression (OR 2.42, 95% CI: 1.60–3.64)
- Lack of association between leisure time physical activity and occupational shoulder pain

D’Onise et al; Occup Med, 2010
Results - Shoulder

- Shoulder pain in Stage 2 and 3
  - 11.5% (95% CI 9.8-13.4)
- Associated with Stage 2 variables:
  - Current smoking
  - Depressive symptoms
  - Shoulder flexion and abduction
  - Knee pain
  - Hip pain
  - Back pain
  - Hand pain

*Multivariate analysis adjusted for age, sex, BMI*
Results - Osteoporosis

- Self reported osteoporosis 50 years and over (Stage 2)
  - 8.8% (95% CI 7.2-10.3)

Table 1: Prevalence of dual energy X-ray absorptiometry (DXA)-diagnosed osteoporosis and osteopenia in patients aged ≥ 50 years

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal DXA scan</td>
<td>867</td>
<td>81.3</td>
<td>(79.1-83.4)</td>
</tr>
<tr>
<td>Osteopenic (-1.0 &gt; T-score &gt; -2.5)</td>
<td>161</td>
<td>15.1</td>
<td>(13.2-17.1)</td>
</tr>
<tr>
<td>Osteoporosis (T-score ≤ -2.5)</td>
<td>38</td>
<td>3.6</td>
<td>(2.6-4.9)</td>
</tr>
<tr>
<td>Total</td>
<td>1066</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Gill et al; 2012
Table 2: Self-reported versus dual energy X-ray absorptiometry (DXA)-diagnosed osteoporosis and osteopenia in patients aged ≥ 50 years

<table>
<thead>
<tr>
<th></th>
<th>No/don’t know</th>
<th>Self reported osteoporosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td>Normal DXA scan</td>
<td>825</td>
<td>84.8 (82.5-86.8)</td>
</tr>
<tr>
<td>Osteopenic (-1.0 &gt; T-score &gt; -2.5)</td>
<td>120</td>
<td>12.4 (10.6-14.4)</td>
</tr>
<tr>
<td>Osteoporosis (T-score ≤ -2.5)</td>
<td>28</td>
<td>2.9 (2.0-4.1)</td>
</tr>
<tr>
<td>Total</td>
<td>973</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Gill et al; 2012
Results – Prevalence Stage 3

- Stage 3, 74% had pain in at least one of hand, foot, shoulder, knee, hip, back

<table>
<thead>
<tr>
<th>Number of areas</th>
<th>n</th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No pain/don’t know</td>
<td>645</td>
<td>26.0 (24.3-27.7)</td>
</tr>
<tr>
<td>One joint</td>
<td>563</td>
<td>22.6 (21.0-24.3)</td>
</tr>
<tr>
<td>Two joints</td>
<td>461</td>
<td>18.5 (17.1-20.1)</td>
</tr>
<tr>
<td>Three joints</td>
<td>375</td>
<td>15.1 (13.7-16.6)</td>
</tr>
<tr>
<td>More than three joints</td>
<td>441</td>
<td>17.1 (16.3-19.3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2484</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Results – Vitamin D

- 21.9% (95%CI 20.3-23.6) classified as vitamin D insufficient, 0.9% (95% CI 0.6-1.3)

- No significant difference between those with joint pain and those without in terms of vitamin D levels

- Higher the number of areas of pain, the higher the proportion classified as deficient or insufficient

Table 4: Proportion classified as deficient/insufficient by number of areas of pain

<table>
<thead>
<tr>
<th>No pain/ don’t know (%)</th>
<th>One joint (%)</th>
<th>Two joints (%)</th>
<th>Three joints (%)</th>
<th>Four or more joints (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deficient/ Insufficient</strong></td>
<td>20.6</td>
<td>21.3</td>
<td>24.5</td>
<td>24.8</td>
</tr>
<tr>
<td>Sufficient</td>
<td>79.4</td>
<td>78.7</td>
<td>75.5</td>
<td>75.2</td>
</tr>
</tbody>
</table>
Results – Vitamin D

- Unadjusted odds ratios, vitamin D insufficiency associated with hand pain (OR 1.35; 95%CI 1.09-1.66, p=0.005) and back pain (OR 1.22; 95%CI 1.01-1.49, p=0.044)

- Association remained only for hand pain when adjusted by age, sex, season (OR 1.32; 95%CI 1.06-1.65, p=0.013)
Conclusion

- First cross-sectional and longitudinal data of specific joint symptoms in an Australian population study
Future

- Test-retest Stage 2 and Stage 3 musculoskeletal questions
- Longitudinal analysis of hip, knee, hand, foot, back pain
- Analysis of gout and associated factors
- Analysis with inflammatory markers, serum urate, other blood test markers


Contact details

- Tiffany Gill
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- North West Adelaide Health Study website
http://www.nwadelaidehealthstudy.org

- Population Research & Outcome Studies Unit (The University of Adelaide)

- The Health Observatory (The University of Adelaide)