Cardiovascular risk factors are increased in people reporting chronic pain symptoms.
Background: Chronic pain

- Chronic pain
  - (duration >3 months)
  - A prevalent symptom in the general population.

It is associated with poor health.
- encompasses poor general, psychological, social health as well as economic well being.
- Irrespective of pain site or distribution
Chronic Pain and Mortality

• Studies have reported that patients with chronic widespread pain have a reduced life expectancy.
  – Premature mortality from cardiovascular causes of death
  – Premature mortality from malignancy

Severity of Pain and CVD mortality

• CVD mortality increased in those reporting severe chronic pain compared to those with no pain or mild pain symptoms

• Pain severity and distribution of pain appear to be associated with increased mortality

• Much of the excess mortality appears to be due to increased CVD mortality

• The reasons for this are not clear but may reflect lifestyle factors
Possible causes for increased CVD mortality

- Functional interactions between the CVD and pain regulatory systems
  - Influence on BP
- Obesity
- Reduced exercise capacity
- Smoking,
- Sleep disturbances

Are Cardiovascular risk factors increased in patients reporting Chronic pain?
Aim

• To explore whether cardiovascular risk factors are increased in people reporting chronic pain

• To examine whether distribution (multiple sites of pain) or severity of chronic pain are associated with CVD risk factors
Data source: The Generation Scotland : Scottish Family Health Study (GS:SFHS)

- £8.1 million project
- Scottish Executive's Genetics and Healthcare Initiative
- Population based study
- Record linkage with medical records
- The health of recruits may be reviewed indefinitely by accessing their medical records
- Data collection started in 2006
Participants

• Proband aged between 35 and 65
  Recruited through GP

• Participants, & consenting first degree relatives (aged 18+)

• Undergo detailed clinical assessment
  – Recording comorbidity
  – Blood and urine samples
  – Cognitive tests are performed and lifestyle information is collected.
Pain questionnaire

Chronic Pain (pain duration >3 months)

- In the past 3 months,
  - How intense was your worst pain?
  - How intense was your usual pain?
  - Pain intensity scored on a 0-10 on visual analogue scale (VAS)

What sites did you have pain?

- Back Pain
- Neck or shoulder pain
- Headache, facial or dental pain
- Stomach ache or abdominal pain
- Pain in your arms, hands, hips, legs or feet
- Chest pain
- Other pain
Pain categories

• Moderate-severe chronic pain
  – If they reported a usual pain intensity of $\geq 5/10$ on VAS

• Widespread/ multi-site pain
  – If they reported usual pain at any intensity at 3 or more body areas.
Cardiovascular risk factors

- Blood pressure (BP)
  - High systolic > 140 mmHg
  - High diastolic > 95 mmHg

- Random blood glucose (BG)
  - Random BG > 11.1 mmol/L
  - Fasting BG > 7 mmol/L

- Smoking status
  - Ever vs. never smoking

- Waist : hip ratio
  - Ratio > 0.95 Males & > 0.8 Females

- Body mass index (BMI)
  - Obese if BMI ≥ 30 kg/m²

- Lipids
  - Total cholesterol (TC)
    - High TC ≥ 5 mmol/L
  - HDL cholesterol (HDL C)
    - Low HDL C < 1 mmol/L
  - TC: HDL C ratio
    - High if ratio ≥ 5
Analysis

Associations were explored between elevated levels of individual cardiovascular risk factors and the presence of:

- 1) chronic pain
- 2) moderate-severe pain intensity (Pain intensity ≥5)
- 3) multisite/widespread pain (≥3 sites of pain)

Comparator group: free from chronic pain

• Logistic regression adjusting for age and gender.
• Multivariate logistic regression was used to identify which CVD risk factors were independently associated with pain states.
Results

- By 2009 8093 participants had complete data.
- Mean age was 46.8 yrs (SD 14.8).
- 58% were female
- 39.8% any chronic pain
- 12.9% chronic moderate-severe pain
  (usual pain intensity $\geq 5$)
- 10.8% widespread/multi-site pain
  (usual pain at 3 or more sites)
- Females twice as likely to report,
  - 1) chronic moderate-severe pain
  - 2) widespread pain.
Any chronic pain

High TC  Low HDL  High TC:HDL ratio  Obese  Ever Smoker  High systolic BP  High diastolic BP

OR 95%CI (adjusted for age and gender)

(adjusted for age and gender)
Moderate-severe pain intensity

OR 95%CI (adjusted for age and gender)

- High TC: 0.7
- Low HDL: 1.0
- High TC:HDL ratio: 1.4
- Obese: 2.0
- Ever smoker: 3.0
- High systolic BP: 2.0
- High diastolic BP: 3.0
Widespread/multi-site pain

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR 95% CI (adjusted for age and gender)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High TC</td>
<td>0.7</td>
</tr>
<tr>
<td>Low HDL</td>
<td>1.0</td>
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Widely distributed pain is associated with various factors, including high total cholesterol (TC), low HDL cholesterol, high TC:HDL ratio, obesity, and a history of smoking. The odds ratios (OR) and 95% confidence intervals (CI) demonstrate the increased risk associated with these factors, adjusted for age and gender.
Multivariate models

Model 2: Predicting any chronic pain

Model 2: Predicting widespread high intensity pain
Multivariate analysis revealed that

- Dyliptidaemia, (T-Chol:HDL ratio)
- Obesity
- Smoking
- Increasing age

Strength of association was greatest in those with multiple sites of high intensity chronic pain.

Adding activity into model did not influence associations.
Multivariate models stratified by pain group

Model 3: Widespread pain (n=948)
Associations with moderate/severe pain

Model 4: moderate-severe chronic pain intensity (n=1148)
Associations with widespread pain
Conclusion

- Chronic pain is associated with elevated levels of modifiable CVD risk factors.

- This appears to be more marked in those reporting moderate-severe intensity pain and chronic widespread/multifocal pain.

- CVD risk factor reduction may improve survival in these patients.
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