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Context

- In Canada, heart disease is among the most common chronic conditions, with 2.6 million Canadians over the age of 20 living with diagnosed heart disease.
- We know that some risk factors for heart disease are modifiable, such as reducing tobacco and alcohol intake, maintaining a healthy weight, and staying physically active.
- However, what remains less clear is the association between other factors – such as occupational stress – on heart disease.
- For those with particularly stressful occupations – such as military service members and police – understanding this association is important both for determining possible mitigation efforts throughout an individual's career as well as when determining benefit and disability eligibility.
- This rapid evidence profile provides a summary of the research evidence on the association between occupational stress and heart disease in the absence of a diagnosed mental health condition.

Question

1) What is known about the association between occupational stress, in the absence of a diagnosed mental health condition, and the risk of developing heart disease?

High-level summary of key findings

- We identified 20 evidence documents of which we considered 16 to be highly relevant to the question, including six evidence syntheses and 10 single studies.
- Most of the identified evidence documents examined the risk between occupational stress and coronary artery disease, but we also included documents for which the primary outcome was the risk of incident or recurrent myocardial infarction as well as risk of developing atrial fibrillation.
- For occupational stressors generally, most of the included evidence documents did not identify an association, but some evidence documents for specific types of occupational stressors point towards a positive association, including:
  o between job strain and risk of coronary artery disease
  o between job strain and risk of atrial fibrillation

Rapid Evidence Profile

Association between occupational stress, mental health conditions, and heart disease

2 October 2024

[MHF product code: REP 82]

Box 1: Evidence and other types of information

+ Global evidence drawn upon

Evidence syntheses selected based on relevance, quality, and recency of search

+ Forms of domestic evidence used (🍁 = Canadian)

Data analytics

* Additional notable features

Prepared in the equivalent of three-business days using an 'all hands-on deck' approach

- between effort-reward imbalance and risk of coronary artery disease
  - between long-working hours and risk of coronary artery disease for those in the lowest socio-economic group.
- Challenges with the recency and quality of evidence syntheses point to the potential need for an updated systematic review and meta-analysis.
- Further, this literature could benefit from additional comparative research that examines the effects of different forms of occupational stressors and the comparative risk of heart disease from different occupations and occupational settings.

Framework to organize what we looked for

- Types of heart disease
  - Coronary artery disease (ischaemic heart disease)
    - Obstructive coronary artery disease
    - Non-obstructive coronary artery disease
    - Spontaneous coronary artery disease
  - Cerebrovascular disease
  - Hypertensive disease
- Types of occupational stress
  - Job strain (i.e., high job demands and low individual control)
  - Effort-reward imbalance
  - Long working hours (i.e., more than 40 hours within seven working days)
  - Job insecurity
  - Occupational noise (i.e., exposure to intermittent or consistent loud noises)
- Risk factors
  - Non-modifiable risk factors
    - Biological sex
    - Family history
  - Modifiable risk factors
    - Diet
    - Physical activity
    - Tobacco use
    - Alcohol use
    - Other
- Populations

Box 1: Approach and supporting materials

At the beginning of each rapid evidence profile, we engage a subject matter expert who helps us to scope the question and ensures relevant context is taken into account in the summary of the evidence.

We identified evidence addressing the question by searching ACCESSSS and PubMed. All searches were conducted on 10 September 2024. The search strategies used are included in Appendix 1. In contrast to synthesis methods that provide an in-depth understanding of the evidence, this profile focuses on providing an overview and key insights from relevant documents.

We searched for full evidence syntheses (or synthesis-derived products such as overviews of evidence syntheses) and protocols for evidence syntheses.

We appraised the methodological quality of evidence syntheses that were deemed to be highly relevant using the first version of the AMSTAR tool. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality, medium-quality evidence syntheses are those with scores between four and seven, and low-quality evidence syntheses are those with scores less than four. The AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to evidence syntheses pertaining to delivery, financial, or governance arrangements within health systems or implementation strategies.

A separate appendix document includes:
1) methodological details (Appendix 1)
2) details about each identified synthesis (Appendix 2)
3) details about each identified single study (Appendix 3)
4) documents that were excluded in the final stages of review (Appendix 4).

This rapid evidence profile was prepared in the equivalent of three days of a 'full-court press' by all involved staff.

- o   Military service members
- o   Veterans
- o   Police (RCMP and others)
- o   Black, Indigenous, and People of Colour (BIPOC)
- o   People with pre-existing conditions

What we found

We identified 20 evidence documents examining the association between occupational stress and the risk of developing heart disease. Of these 20 documents, we considered 16 to be highly relevant, including:

- six evidence syntheses
- 10 single studies.

Coverage by and gaps in existing evidence syntheses and domestic evidence

Most of the identified evidence documents examined the risk between occupational stress and coronary artery disease, but the type of coronary artery disease (e.g., obstructive, non-obstructive, spontaneous) was rarely specified. We also included documents for which the primary outcome was the risk of incident or recurrent myocardial infarction as well as risk of developing atrial fibrillation.

While the included evidence documents cover each of the types of occupational stress noted in the framework, there was a particular focus on job stain and effort-reward imbalance. It should be noted that some of the included literature describes the challenge of separating out the different occupational stressors, as many are interrelated.

Non-modifiable risk factors of biological sex, age, and family history were often controlled for in the included analyses. Modifiable risk factors were also considered, particularly the effects of physical activity and alcohol use.

We identified relatively few documents related to specific populations. One single study focused on military service members, while another focused on a cohort of Japanese police officers. Though not included in the framework above, one equity consideration that was well covered in the included literature are the effects of socio-economic status on occupational stress and risk of heart disease.

Key findings from included evidence documents

We have separated out the key findings based on the type of occupational stress. Findings were categorized based on how they were described in the evidence documents.

Occupational stressors generally

One recent medium-quality evidence synthesis and three single studies examined occupational stress generally.

The recent medium-quality evidence synthesis examined occupational stress among military personnel and military aviators and its association with heart disease.(1) While the synthesis confirmed that military personnel and military aviators are exposed to a wide range of occupational and environmental stressors, the synthesis did not identify sufficient evidence to determine whether there is an association between exposure to these stressors and risk of developing heart disease.(1)

With respect to the three single studies, the first is a recent cross-sectional study that reported no association between occupational stress and the odds of developing atrial fibrillation among female workers (OR 0.79, 95% CI 0.61–1.03).(2) The second study is an older cohort study that found occupational stress was not associated with an increased risk of

heart disease among Canadians.(3) However, after conducting a sub-population analysis, the study identified a positive association between women who are in physically demanding jobs and an increased odds of developing heart disease (OR 1.37, 95% CI 1.03–1.83).(3) The final study examined the relationship between physical activity during leisure time, occupational stress, and cardiovascular risk factors among police officers in Quebec. The study reported that physical activity during leisure time (e.g., outside of working hours) moderated risk factors for cardiovascular conditions among those in high stress occupations.(4)

Job strain

Four evidence syntheses and three single studies examined the effects of job strain. Job strain was typically defined as occupational roles that have combined elements of high demand with low control or limited decision-making ability. However, one of the syntheses also included passive jobs, which are defined as those with low demand but also low control or limited decision-making ability.

With respect to coronary artery disease, one older medium-quality evidence synthesis found individuals in high-strain jobs and passive jobs had an increased risk of coronary artery disease compared to those in occupations reporting no job strain.(5) Further, the evidence synthesis found that those in jobs with high strain were associated with a higher relative risk (RR 1.26; 95% CI 1.12–1.41) of developing coronary artery disease as compared to those with passive jobs (RR 1.14; 95% CI 1.02–1.29). However, the synthesis also identified that neither the demand nor control elements of the job-strain model independently explained the association with increased risk of coronary artery disease, pointing to the relevance of both elements. Similarly, one older medium-quality evidence synthesis found moderate certainty evidence (using a GRADE analysis) that a combination of high psychological demands and low decision-latitude are associated with increased incidence of coronary artery disease.(6) A recent cohort study also identified similar results after controlling for age, sex, and family types.(7) The cohort study also found that the duration of job strain did not appear to increase risk of coronary artery disease.(7)

For myocardial infarctions, one older low-quality evidence synthesis found that many of the included studies examining the association between occupational stress and heart disease were insufficiently powered.(8) Two of the acceptably powered analyses included in the synthesis did identify self-reported job strain as a risk factor for incident myocardial infarction after controlling for gender and age.(8) A second older medium-quality evidence synthesis found a significant effect of occupational stress (defined using a demand-control model) on the risk of recurrent myocardial infarctions (HR 1.65, 95% CI 1.23–2.22).(9) In contrast to these findings, a recent large cohort study from Ontario found no association between job strain (as defined by the elements of a demand and control model) and myocardial infarction or congestive heart failure.(10)

Finally, a recent cohort study found a positive association between job strain and atrial fibrillation (HR 1.83, 95% CI 1.14–2.92).(11)

Effort reward imbalance

Two cohort studies examined the effects of occupational roles with effort-reward imbalance on heart disease. Effort reward imbalance is a perceived mismatch between how much effort is being put into a role and the reward – typically salary – that is provided.

An older multiple cohort study found effort-reward imbalance was associated with an increased risk of coronary artery disease (HR 1.16, 95% CI 1.01–1.34). A sub-population analysis found that the association was stronger among those with lower socio-economic status, younger participants, and those with higher job strain, but these analyses were relatively small with low statistical power.(8)

Similarly, a recent cohort study found uncompensated overtime work was associated with an elevated risk of coronary artery disease compared to no overtime work (RR 1.85, 95% CI 1.05–3.25). The study further noted that stronger effects were identified among females and those in lower socio-economic positions.(12)

Long working hours

One older high-quality evidence synthesis and a recent cohort study examined the association between long working hours and heart disease. The older high-quality evidence synthesis found working long hours (defined as more than 55 hours a week) was associated with an increase in the risk coronary artery disease when compared to working standard hours (defined as 35–40 hours per week) (RR 1.13, 95% CI 1.02–1.26).(13) However, a sub-group analysis revealed this association is socio-economic dependent. The synthesis found only those in the lowest socio-economic group had a significant risk of coronary heart disease (RR 2.18, 95% CI 1.25–3.81).(13)

A recent cohort study found working long hours (defined in this study as over 55 hours a week) was associated with an increased risk of coronary artery disease (HR 1.67, 95% CI 1.10–2.53) even after adjusting for age, socio-demographic factors, pre-existing health conditions, and exposures of psychosocial factors.(14)

Job insecurity

One older medium-quality evidence syntheses and one older cross-sectional study examined the association between job insecurity and heart disease. Job insecurity can be defined both by a fear of losing employment but also by having roles that require non-standard working hours (e.g., shift work). One older medium-quality evidence synthesis found that job insecurity was associated with a small elevated risk of coronary heart disease, but the synthesis notes that the association was mediated by socio-economic status.(15)

An older cross-sectional study compared police officers and office clerks in Japan. The study found police officers had higher rates of behaviours that are linked to coronary heart disease including engaging in shift work and overtime work; however, they were also less likely to express the physical and psychological symptoms of occupational stress as compared to office clerks.(16) The study notes that despite not displaying the physical and psychological symptoms, these behaviours may be linked to higher prevalence of coronary heart disease when combined with other risk factors including select lifestyle risk factors such as drinking alcohol and physical inactivity.(16)

Next steps based on the identified evidence

Though many of the included evidence documents describe having identified a positive association between exposure to occupational stress and risk of heart disease, some also mention challenges with sample size and statistical power. Further, some of the more recent large cohort studies did not identify an association. Given the lack of strong conclusions, and the relative age and quality of the identified evidence syntheses, the question posed for this rapid evidence profile could benefit from an updated systematic review/meta-analysis that includes some of the more recent large cohort studies.

Further, additional research efforts could focus on determining the comparative association for different occupational stressors (e.g., whether there is a greater risk of heart disease from occupations with high job strain or from job insecurity) and across different types of employment/employment risks.

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