Sex-Related Differences in Physiological Responses to Emotional Stress
Amber Barker, BS; Kristine Devine, BS; Hannah Landress, BS; Miriam Cortez-Coo Per PT, Ph.D.
Department of Physical Therapy, Georgia Health Science University, Augusta, GA, USA

Background
- Cardiac syndrome X is defined as the presence of angina-like chest pain, a positive response to stress testing and normal coronary arteriograms. (1)
- It occurs in approximately 20-30% of angina patients who undergo coronary arteriography and is higher in women than in men. (1)
- There are sex-related differences in how patients present with CHD-like symptoms. (2)
- These symptoms in women might be caused by an anxiety disorder rather than being cardiac in origin. (2)

Purpose and Hypotheses
- To determine the physiological responses to an emotional stress in men versus women.
- We hypothesized that the women would have a greater SBP response to the visual stimulus than the men. We also hypothesized that there would be no difference between men and women with respect to skin BF in response to a visual emotional stimulus.

Methods
- **Study Design:** Single session, pre-test/post-test with each subject serving as his/her own control.
- Participants were fasted from food or drink for 4 hours, refrained from exercise and alcohol consumption for 24 hours, and did not take any medications that could alter physiological response.
- Subjects were instrumented and given the trait anxiety questionnaire.
- Skin BF, BP, and HR were monitored continuously before, during and after an 80 video second video chosen to elicit an emotional response.
- **Pre-test/Post-test Measures**
  - Skin BF (Laser Doppler)
  - BP (beat-by-beat, Finometer)
  - HR (Bioharness)
  - State/Trait anxiety questionnaire

Results

<table>
<thead>
<tr>
<th>Subject Characteristics</th>
<th>Men (N=5)</th>
<th>Women (N=5)</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>23.7 (±0.7)</td>
<td>23.4 (±0.5)</td>
<td>23.7 (±0.7)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>178.8 (±7.7)</td>
<td>168.2 (±5.4)</td>
<td>173.5 (±8.4)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>75.4 (±7.9)</td>
<td>65.4 (±7.9)</td>
<td>70.4 (±9.2)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>23.6 (±1.7)</td>
<td>23.1 (±2.6)</td>
<td>23.3 (±2.1)</td>
</tr>
<tr>
<td>Trait Anxiety Score (20-80)</td>
<td>45.8 (±2.4)</td>
<td>49.0 (±1.9)</td>
<td>47.4 (±2.6)</td>
</tr>
<tr>
<td>Baseline State Anxiety Score (20-80)</td>
<td>46.8 (±2.9)</td>
<td>47.8 (±2.5)</td>
<td>47.3 (±2.6)</td>
</tr>
<tr>
<td>Post-video State Anxiety Score (20-80)</td>
<td>46.6 (±4.0)</td>
<td>45.4 (±3.4)</td>
<td>46.0 (±3.6)</td>
</tr>
<tr>
<td>Baseline HR (beats/min)</td>
<td>74.7 (±8.3)</td>
<td>80.4 (±9.6)</td>
<td>75.8 (±9.1)</td>
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</tbody>
</table>

Discussion
- Although the increase in SBP was not different between men and women, the men had a higher average (9.9 9.6mmHg) increase than women (3.9 3.6mmHg).
- In regard to sex, no significant difference in skin BF was recorded in response to the video, but women responded with a larger overall change in skin BF.
- If these trends were to continue in a larger sample size, they could reach significance.
- An 80 second emotional stimulus appeared to be too short to elicit a significant change in state anxiety.
- In response to the video, men and women both responded similarly and experienced vasoconstriction, demonstrated with a decrease in skin BF and an increase in SBP.
- The transience of the responses recorded, small sample size, and/or variability of how emotions are expressed between men and women could be reasons why our hypothesis was rejected.

Conclusions
A short video meant to elicit an emotional stress stimulated peripheral vasoconstriction, causing an overall decrease in skin BF and an increase in SBP in both men and women. However, it would be beneficial to carry out further testing with a larger sample size to determine whether women could, in fact, have a more significant change in physiologic response to a short anxiety-provoking stimulus than men.

Clinical Implications
It is important health care professionals recognize that emotions and emotional stress can influence a patient's blood pressure as well as other physiological responses. This finding further reinforces the significance of routinely monitoring vital signs, including blood pressure, throughout patient interactions.

Resources: