The Effect of Posture on Breathing, Pulse and ECG

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Background Information

• Gas exchange is dependent on ventilation
  – Inspiration fills the alveoli with fresh air, and expiration removes stale air
• CO₂ concentration in the plasma controls respiratory depth and rate
  – Poor posture provokes respiratory changes, therefore leads to labored breathing

Variables

• Independent Variable - Posture
• Dependent Variables - Breathing depth, pulse rate, and R wave amplitude
Hypothesis

- We predict that when sitting up straight, breathing depth, pulse rate, and R wave amplitude will be normal.

- However, when sitting with poor posture, breathing depth and pulse rate will increase and R wave amplitude change.

Method

1. The subject was hooked up to the electrodes, pulse transducer, and respiratory belt.
2. For the first 2 min, we measured the baseline of the subject sitting straight.
3. The subject then sat in a hunched over position with her feet up for 5 min.
4. A recovery period was then measured for 2 min with the subject sitting up straight.
5. This was repeated again for subject 2.

Results

Effect of posture on breathing depth

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<th>Baseline</th>
<th>Poor Posture</th>
<th>Recovery</th>
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<td>Subject 1</td>
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Effect of posture on pulse rate

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Results

Effect of posture on R wave amplitude

Discussion

- Poor posture decreases the thoracic cavity volume forcing breathing depth to increase to bring more fresh air into the lungs
  - Chemoreceptors detect high level of CO₂ in the plasma
  - Therefore, breathing depth increases to promote diffusion of CO₂ out of the body
  - Pulse rate would increase because the body has a greater need for O₂, to increase blood flow to get more O₂ in the tissues

Discussion Continued

- The R-wave amplitude of the ECG increased for only one subject, most likely due to the change in the position of the heart in the thoracic cavity.
  - Our hypothesis was proven correct for 2 out of 3 predictions.

Future Experiments

- Test the effects of other positions
- Use more subjects in the experiment
- Record data for longer time periods
- Long term effects of posture on physiology
References