Neck Strength, Flexibility, Posture, and Proprioception in U.S. Army Pilots with and without a History of Neck Pain

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1. Introduction

• Neck pain (NP) is common among military helicopter pilots.
• Previous military helicopter pilots with a history of NP demonstrated less neck strength and flexibility when compared to pilots without a history of NP.
• Other factors such as weak scapular muscles, prior head and shoulder posture have not been investigated in military helicopter pilots.
• The purpose of the study was to investigate neck strength, flexibility, posture, and proprioception in pilots with and without a history of NP.

2. Methods

SUBJECTS (Table 1)

Twenty-seven male pilots with a history of NP and age-matched pilots.
• Pain Characteristics (0-10 Numeric Scale: 4.0 ± 1.7, pain duration: 1.5 ± 1.7 days, and Neck Disability Index: 6.9 ± 5.6)
• Neck pain (NP) is common among military helicopter pilots.
• Previously, military helicopter pilots with a history of NP demonstrated less neck strength, flexibility, and forward head posture (Figure 2).
• A modified 16-inch combination square (Swanson Tool Co., Franklin, IL) for forward shoulder posture and pectoralis minor length.

PROCEDURES

• For strength testing, after warm-up trials, pilots performed the maximal isometric contraction against Biodex for neck and scapular strength and the maximal isokinetic contraction against Biodek for the upper scapular strength.
• For flexibility testing, pilots were CROM 3 and actively rotated neck in each direction (flexion, extension, lateral flexion, and rotation) three times.
• Forward head posture was assessed in a sitting position wearing CROM 3 with a head-attachment, and the horizontal distance from CP and mid-sagittal was measured.
• Forward shoulder posture was assessed in standing, and the distance from the wall to the anterior tip of the acromion process was measured.
• Pectoralis minor length was assessed in a supine position, and the distance from the floor to the posterior tip of the acromion process was measured.
• For all postural assessments, an average of three trials were used.
• For neck proprioception, pilots were positioned in a right-lateral decubitus position targeted at position (with guidance), and replicated the target position without guidance to evaluate joint angle differences (four target positions).

STANDARDIZED TESTS

• Lafayette handheld dynamometer (HHD) and the Biodex System 3 PRO (with guidance), and replicated the target position without guidance to evaluate joint angle differences (four target positions).
• CROM 3 (Performance Attainment Associates, Lindstrom, MN) for neck flexibility, extension, lateral flexion, and rotation.
• Posture was measured in centimeters (cm) for forward head posture, forward shoulder posture, and pectoralis minor length.
• Proprioception was measured in degrees (°) for each target position (R30, R60, L30, and L60).

3. Results

• No significant differences on neck and scapular strength (Table 2).
• Pilots with a history of NP had significantly less neck flexibility on extension, anterior tilt, right lateral, and rotation.
• For neck and scapular strength, the results demonstrate suboptimal neck flexibility in pilots with a history of neck pain.

4. Conclusion

• The results demonstrate suboptimal neck flexibility in pilots with a history of neck pain.
• Operating a helicopter with limited neck flexibility or neck pain may negatively impact flight safety and force readiness.
• It is important to assess neck flexibility routinely and address limitations with stretching exercises.

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