Comparison of Trunk and Hip Strength and Flexibility between Pilots with and without a Self-Reported History of Low Back Pain

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Context: Low back pain (LBP) is one of the most common musculoskeletal issues facing military personnel, with a high prevalence reported in helicopter pilots. Although several risk factors (age, history of LBP, total flight-hours, total night-vision goggle flight-hours) have been previously identified, modifiable musculoskeletal characteristics have not been investigated in this population. Less trunk and hip strength and flexibility have been previously observed in individual with LBP in civilian studies. Objective: To compare trunk and hip muscular strength and flexibility in pilots with and without a history of LBP. It was hypothesized that pilots with a history of LBP would exhibit less trunk and hip strength and flexibility than pilots without a history.

Design: A cross-sectional design. Setting: University sports medicine laboratory.

Patients or Other Participants: A total of 62 pilots with at least 100 flight-hours (previous 12 months), no current LBP, and no physical training restrictions on the day of testing participated in this study. The 31 pilots (aircrafts: AH64=8, UH60=10, CH47=3, OH58=10) with LBP history (29 males/2 females, Age: 31.5±5.9years, HT: 177.1±6.3cm, WT: 84.4±11.3kg, total flight-hours: 1293±1317hrs) were matched on gender, age (±5yrs), and total-flight hours (±500hrs) with pilots (aircrafts: AH64=8, UH60=11, CH47=3, OH58=9) without LBP history (29 males/2 females, Age: 31.5±5.9years, HT: 176.9±8.8cm, WT: 82.9±14.6kg, total flight-hours: 1291±1312hrs).

Interventions: An isokinetic dynamometer was used to evaluate isometric hip abduction and isokinetic concentric trunk flexion, extension, and rotation strength. A digital inclinometer was used to measure passive hip internal/external rotation and active lumbar spine flexion/extension, lateral flexion, and rotation flexibility. Paired t-tests or Wilcoxon tests were used to compare between two groups (p<0.05).

Main Outcome Measures: Hip abduction and trunk flexion, extension, and rotation average peak torque were normalized to body weight (%BW). The average of three measures was recorded for hip internal/external rotation and lumbar spine flexion/extension, lateral flexion, and rotation flexibility. Paired t-tests or Wilcoxon tests were used to compare between two groups (p<0.05).

Results: The LBP group demonstrated significantly weaker trunk extension strength (LBP: 345.5±78.1%BW, non-LBP: 404.5±66.0%BW, p=0.004). The LBP group had significantly less trunk lateral flexion right (LBP: 21.5±4.1°, non-LBP: 26.4±4.6°, p<0.001) and left (LBP: 23.0±4.4°, non-LBP: 26.8±4.7°, p=0.005) and right rotation flexibility (LBP: 9.4±3.2°, non-LBP: 11.4±3.9°, p=0.043).

Conclusions: The current investigation revealed musculoskeletal characteristics that are associated with pilots with a self-reported history of LBP. For allied health professionals working with a military population, identifying modifiable musculoskeletal characteristics associated with individuals with LBP is essential for treatment and prevention of LBP. Future studies are needed to confirm if these characteristics are predictive of LBP and loss of duty days due to medical leave. Additionally, further research on other modifiable neuromuscular factors (e.g. trunk proprioception, posture, and balance) is warranted. Supported by USAMRMC #W81XWH-11-2-0097

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