
Non-sleep deprived warfighters who are required to maintain alertness for long periods of time during continuous or sustained operations are susceptible to significant deterioration in key aspects of cognitive performance, particularly vigilance. Intervention to maintain performance is necessary to meet demanding mission requirements during sustained and surge aviation operations. Caffeine is safe and effective strategy to enhance cognitive performance.

The objective of the study was to determine whether moderate doses of caffeine formulated in tube foods could enhance cognitive performance in a laboratory study designed to simulate the cognitive demands of a U-2 mission.

Caffeine has been studied extensively but as per the author’s knowledge, this was the first investigation of the effect of caffeinated food as opposed to a beverage on performance. Additionally, caffeine had not been studied in simulated aviation environment. Duration of testing and specific cognitive tests used in this investigation were specifically designed to replicate the cognitive demands of U-2 environment.

The cognitive performance and mood data from the investigation support the hypothesis that caffeinated tube food attenuates some performance decrements associated with sleep loss. Statistically significant improvement in performance due to caffeine administration compared with placebo were present in all five cognitive tasks either as main effects, interactions or absence of significant degradation in the caffeine treatment condition compared with placebo condition. The author recommends further research to conduct, to compare pharmacokinetics of caffeinated food to liquids, pills and gums.

Based on the result of this investigation, caffeinated tube food is an effective tool for sustaining cognitive performance and vigilance during extended and night time U-2 operations. Results may be generalized to the other population who wear complex protective clothing that create confining or encapsulating environment such as space suits, integrated flying suits (e.g. in Su-30 MKI) or chemical warfare suits, for extended work periods where tube foods are the only foods that can be consumed.


Spinal injuries and some other common aeromedical problems, especially cervical and lower back pain (LBP) are attributed to multitude of aviation stresses viz, +Gz forces, vibration and improper posture of the pilot.

This study evaluated the cervical and lumbar spine with magnetic resonance imaging (MRI) to assess the prevalence of degenerative changes of spine in 3 groups of pilots viz, transport (TP), helicopter (HP) and fighter pilots (FP).

10 pilots in each category with mixed representation of different aircraft types, having more than 10 yrs of experience, were evaluated for degenerative pathological changes using MRI by 2 experienced musculoskeletal radiologists, trained on MRI using a common grading scheme independently to minimize the inter-interpreter difference. Cervical and lumbar pain was also evaluated by the subjects themselves based on a standard questionnaire.

Anthropometric parameters and physical exercises were not significantly correlated with cervical and lumbar injuries. In both parts of the spine, central disk protrusion was found to be more common than lateral. Cervical pain was infrequent although LBP was common problem with similar prevalence in all three groups. High prevalence of cervical changes was found in asymptomatic individuals.

Cervical spine degeneration was seen in 16/29 subjects with C5-6 intervertebral disk being most frequently affected followed by C6-7 and C4-5. Cervical spine degenerative changes were more frequent in older TP and much less in younger FP despite their exposure to high +Gz.

Lumbar spine degeneration was seen in 18/30 subjects. Lower lumbar spine was involved in TP and FP while upper lumbar spine was frequently involved in HP. It was found to be positively correlated with cervical changes which indicated age related degenerative changes. HP had high prevalence of lumbar injuries inspite of younger age.

HP had high prevalence of lumbar degenerative changes as expected while FP did not have high prevalence of cervical changes. Prevalence of upper lumbar spine injury needs to be substantiated with further research to find the pathophysiological link with occupational exposure as it may help direct ergonomic efforts to reduce posture related discomfort.