The Relationship Between Body Fat, Injury, and Musculoskeletal/Physiological Performance in Naval Special Warfare Operators

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ABSTRACT

Naval Special Warfare (NSW) Operators complete extremely demanding training and occupational tasks. Body composition is an important component of fitness and has been identified as a risk factor for injury, and the relationship between body fat (BF%) and injury is of significant importance to understanding injury prevention strategies. To determine the relationship between BF%, injury history, and musculoskeletal/physiological performance in Naval Special Warfare (NSW) Operators, a total of 237 NSW Operators (Age: 28.4±6.0 yrs, Height: 1.78±0.1 m, Mass: 85.6±9.4 kg) were assessed for body fat (BF%) collected with Bod Pod (Cosmed, Chicago, IL). The relationship between BF%, injury history, and musculoskeletal/physiological performance in Naval Special Warfare (NSW) Operators was assessed for this study. Two-year retrospective injury data was collected from the University of Pittsburgh Military Epidemiological Database (UPitt-MED) and injury count was positively associated with BF% (r=0.12, p=.057). Exploratory best-fit plots determined 15% BF as an inflection point threshold for increased injury, decreased strength, and decreased power. The best-fit plot of BF% and VO2Max demonstrated a negative, linear relationship (r=-0.31 to -0.49, p<.05). All strength variables except for LF strength were significantly, negatively correlated with BF% (r=-0.02 to -0.04, p=.05 to .08). Anaerobic power and capacity (W/kg) were significantly, negatively correlated with BF% (r=-.22 to -.69, p<.01). Significant correlations were observed between injury count and both increased injury (r=0.12, p=.057) and decreased performance (r=-0.31 to -0.49, p<.05) in NSW Operators. Intervention programs should aim to preserve optimal body composition throughout an operator’s career in order to promote injury prevention as well as physical and tactical readiness.

INTRODUCTION

Naval Special Warfare (NSW) Operators are a unique group of tactical warriors
• Must possess a high level and broad range of physical fitness characteristics
• Must maintain optimal tactical readiness and injury resilience
• NSW Operators perform extremely strenuous and training and occupational tasks
• High risks of musculoskeletal and overuse injuries
• High frequencies of injuries in the lower extremity
• Injuries may serve as significant detriment to force readiness
• Potential time loss from training and work
• Time and cost of injury rehabilitation

Identifying modifiable risk factors for injury and optimal performance of NSW is critical
• Maintenance of optimal body composition is an integral component of physical fitness
• May impact operator’s physical fitness, injury status, overall health
• Few studies have explored relationship between body composition, performance, and injury in US Special Warfare population
• Limited research has observed trend towards higher body fat (BF%) accumulation and decreased endurance performance over time

LIMITED RESEARCH HAS OBSERVED TRENDS TOWARDS HIGHER BODY FAT (BF%) ACCUMULATION AND DECREASED ENDURANCE PERFORMANCE OVER TIME

Purpose was to determine the relationship between BF%, musculoskeletal strength, anaerobic power and capacity, and aerobic capacity/lactate threshold in NSW personnel

PROCEDURES

Injury Data Collection
• Summary of Pittsburgh Military Epidemiological Database (UPH-MED)
• Collection of number, type, and severity of musculoskeletal injuries sustained by NSW Operators (FIGURE 5)
• Two-year retrospective injury count assessed for purpose of this study

Programs
• Injury count was positively associated with BF% (r=0.12, p=.057) (FIGURE 5)
• All strength variables except LP strength significantly correlated with BF% (r=0.12 to 0.49, p<.05) (FIGURE 6-8)
• Anaerobic power/capacity and aerobic capacity/lactate threshold correlated with BF% (r=-.22 to -.83, p<.01) (FIGURES 9-10)

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