

消防用防護服着用時に実施する 運動・バランス能力テストの有効性検討

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Evaluation of the Mobility with Personal Protective Equipment for Firefighters and the Validity of Those Test Methods

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ABSTRACT

The purpose of this study was to investigate the effects of PPE's weight and the harness design of SCBA on mobility of those users and to determine the validity of physical performance test, three functional balance tests, and postural balance test as a standard mobility test method when wearing the PPE. A total of 10 Japanese healthy males (not trained) performed balance tests in this study. Participants were required to wear followed five clothing conditions with different weight and designs, randomly. In CON, participants wore T-shirt and short pants. In ST, they wore PPC without SCBA. In TA and TB, they wore PPC and SCBA with old harness design (TA and TB: 13.1kg and 6.9kg of SCBA, respectively). In TC, they wore PPC and SCBA (6.9kg) with improved harness design. For the physical performance test, participants carried out the following tasks inside the experiment building, (1) Step up; (2) Side jump; (3) Crawl; (4) Object-dragging; (5) Obstacle stride. For the functional balance test, Performance time was measured for 'Wooden plank time' and 'Timed up and go' test. For the

'Functional reach' test, participants extended their right arm forward as far as possible, and the extended distance were measured. We measured COP for postural balance test and from these sway data, measurements of medial-lateral (ML) and anterior-posterior (AP) excursion, sway length, and the area of each test were available. As results, a heavy SCBA limits wearers' mobility, however, we could not determine any difference between harness systems (standard versus improved). It was possible to find significances among clothing conditions using several kinds of motions of physical performance test and functional balance test. Therefore, the test method of present study, especially physical performance and functional balance test is valid and convenient method for evaluating mobility of PPE users, and it shows more statistically different results than postural balance test.

要 旨

本研究は消防用防護服着用時の動作性評価ができる準評価テスト方法を提案するため行われた。個人防護装備の重さとのデザインが、バランス能力に及ぼす影響を検討した。また、運動能力テスト、バランス能力テスト、重心動揺測定方法の有効性を調べ、より判別力が高い方法を提案することに着目した。10名の男子大学生を被験者とし、着衣条件は以下の5条件とした：①0.5kgの運動服、②8.7kgの防護服、③防護服と13.1kg空気呼吸器、④防護服と6.9kg空気呼吸器、⑤防護服と6.9kg空気呼吸器（改善されたハーネス付き）。各条件の着衣後に運動能力とバランス能力テスト、重心動揺測定を行った結果、空気呼吸器の重さが重くなるほど着用者のバランス能力が低下する傾向が認められたが、デザインの違いによる動作性の変化は見られなかった。本研究結果で運動能力とバランス能力テストが、重心動揺測定法より有意な条件間の差異が認められたため、より有効な測定方法になることが示唆された。