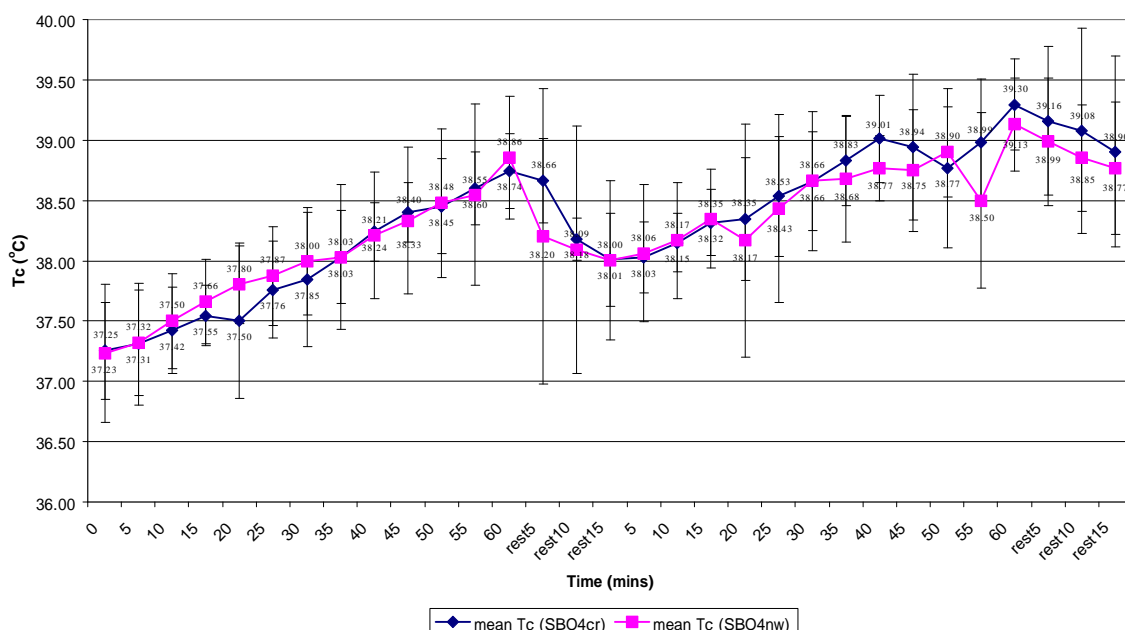


# A COMPARISON OF TEMPERATURE REGULATION, FLUID EXCHANGE AND HEART RATE RESPONSE BETWEEN TWO LOAD BEARING SYSTEMS

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We evaluated temperature regulation and fluid exchange of first-year soldiers wearing two webbing and full-pack systems. Twelve volunteers performed two repeated trials wearing the current webbing (SBOcr) comprising of strap based system and a new vest webbing system (SBOnw). They were separated into two groups walking at speeds of  $4\text{km}\cdot\text{hr}^{-1}$  ( $n=7$ ) and  $5\text{km}\cdot\text{hr}^{-1}$  ( $n=5$ ) on a treadmill. The trials were conducted in a climatic chamber ( $33^{\circ}\text{C}$  dry bulb; 65% RH;  $850\text{ W}\cdot\text{m}^2$  radiation). They walked for two cycles of 60 min, with 15 min of rest. Another group of  $N=18$  volunteers performed the trials wearing the webbing and with the respective current (FBOcr) and new (FBOnw) full-pack system. They performed trials at walking speeds of  $3.5\text{km}\cdot\text{hr}^{-1}$  ( $n=12$ ) and  $5\text{km}\cdot\text{hr}^{-1}$  ( $n=6$ ). Core temperature ( $T_c$ ) in SBO trial ranged between  $37.1\pm 0.4^{\circ}\text{C}$  and  $39.1\pm 0.4^{\circ}\text{C}$  (SBOcr) and between  $37.1\pm 0.5^{\circ}\text{C}$  and  $38.9\pm 0.2^{\circ}\text{C}$  (SBOnw). There was no significant difference in mean  $T_c$  between SBOcr and SBOnw trials ( $P>0.05$ ). In the FBO trial,  $T_c$  ranged between  $37.1\pm 0.5^{\circ}\text{C}$  and  $38.8\pm 0.7^{\circ}\text{C}$  (FBOcr) and between  $37.0\pm 0.5^{\circ}\text{C}$  and  $39.1\pm 0.5^{\circ}\text{C}$  (FBOnw). No statistical significance was reported. Mean heart rate (HR) in SBOcr trial ranged between  $115\pm 11\text{bpm}$  and  $168\pm 21\text{bpm}$  in the first cycle and between  $125\pm 29\text{bpm}$  and  $169\pm 17\text{bpm}$  in the second cycle. In the SBOnw trial, mean HR ranged between  $108\pm 19\text{bpm}$  and  $165\pm 19\text{bpm}$  in the first cycle and between  $120\pm 27\text{bpm}$  and  $158\pm 10\text{bpm}$  in the second cycle. Although not significantly different, the SBOcr trial recorded 5 to 11bpm higher mean HR in the second cycle compared to the SBOnw trial. It could be concluded that the subjects needed greater physical effort to move with the SBOcr system after some degree of fatigue had set in. Mean fluid intake in the SBO trials was  $1.77\pm 0.5\text{L}$  (SBOcr) and  $1.89\pm 0.6\text{ L}$  (SBOnw). In the FBO trials, mean fluid intake in the FBOcr and FBOnw trials were  $1.95\pm 0.53\text{L}$  and  $2.35\pm 0.61\text{L}$  respectively. The FBO system resulted in higher fluid intake compared to the FBOcr trial. Mean sweat rate (SR) in all the trials, including current and new load-bearing system (LBS), ranged between  $16\text{ml}\cdot\text{hr}^{-1}$  and  $19\text{ml}\cdot\text{hr}^{-1}$ , except for the two SBO trials at  $5\text{km}\cdot\text{hr}^{-1}$  which had means SR of  $25\text{ml}\cdot\text{hr}^{-1}$  and  $26\text{ml}\cdot\text{hr}^{-1}$ . The present study has found the LBSnw system to be an improvement to the LBScr system in terms of weight distribution. The volunteers responded similarly to both to the LBS systems for all factors, except for higher heart rate in the SBOcr trial, and they felt cooler when using the LBScr system. The level of heat stress was found to be similar between the two systems. The advantage of this study provided comparisons of the thermoregulatory responses to the existing and new webbing systems worn by the soldiers.

Mean±SD of Core Temperature ( $T_c$ ) in SBO when walking at  $4\text{km}\cdot\text{hr}^{-1}$  with 5% gradient



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