In military operations, soldiers are often exposed to various stressors such as prolonged and strenuous physical exercise combined with sleep, energy and fluid deficiency and extreme ambient temperature. The aim of this study was to investigate the physiological strain and performance of soldiers during 12 days winter operation consisting of combat (days 1-5) and combat shooting phases (days 6-12).

Subjects were 21 male jaegers from an infantry troop. Their physical characteristics were (mean ± SD): age 19.6 ± 0.6 years, height 176.9 ± 6.6 cm, body mass 71.5 ± 9.9 kg and body fat 13.9 ± 2.5 %. Each subject participated three times in maximal muscle performance and oxygen consumption (maxVO2) and heart rate (maxHR) tests. The tests were carried out three days before the operation (T1), at the 5th day (T2) and at the 12th day of the operation (T3). Maximal isometric leg extension (LE) and static jump (SJ), counter movement jump (CMJ) were tested. Anaerobic power (AP) of the legs was calculated by five consecutive CMJs. SJ, CMJ and WR were also measured every day during the operation in the field. Physical activity (distance, speed) during a day was estimated by a GPS-recorder from 4 subjects. Blood samples were taken during T1, T2 and T3, and blood volume, concentrations of creatinine kinase (CK), testosterone (TestT) and interleukine-6 (IL6) were analysed. The soldiers were asked about their physical work capacity and physical stress of the tasks every day using a 1 to 10 scale questionnaire.

Average daily ambient temperature was -5 °C (range -12 – 0 °C). Average speed on foot was 1.0 to 1.9 km/h and distance 3 to 15 km per day. By all-terrain vehicles the soldiers moved 3 to 57 km per day. Mean maxVO2 of the soldiers was 45.1 ± 1.1 and 43.9 ± 1.1 ml/kg/min (ns) and maxHR 188 ± 2 and 178 ± 3 b/min (p<0.05) in T1 and T3, respectively. Changes in SJ, CMH and LE were not significant while maximal rate of the force production of the leg decreased from 13.0 ± 6.4 in T1 to 9.3 ± 5.1 kN/s (p<0.001) in T3. Daily measurements after strenuous physical activity showed significant decrement in muscle performance. Daily experience of the physical strain of the tasks varied from strenuous (4) to less strenuous (9), mean value being 6.5 ± 1.2. Work capacity was experienced as fairly good (6 to 8). Blood volume increased by 3.5 % during the operation. CK increased and TestT decreased during combat phase, while concentration of IL6 increased towards the end of the operation.

Subjective sensations, minor changes in cardiorespiratory and neuromuscular performance as well as changes in hormone concentrations suggest that the physiological strain of the motorized, physically fit male infantry soldiers remained low. The results also reflect either cold adaptation or training effect induced by the 12 days military operation.