Hypoxia and cold are two environmental influences whose effects on muscle function have previously been studied in isolation (e.g. Bergh and Ekblom, 1979; Young et al., 1980) rather than in combination. This study examined the individual and combined effects of hypoxia and limb cooling on the voluntary strength and maximal-intensity short-duration exercise performance of the knee extensors. Ten males (mean ± SD: age 22.4 ± 3.8 y; stature 1.78 ± 0.08 m; mass 83.1 ± 13.8 kg) attended the laboratory on four occasions. On each occasion, the experimental protocol consisted of 30 minutes seated rest followed by tests of muscle function under the following conditions: 1) normoxia without limb cooling; 2) hypoxia without limb cooling; 3) normoxia with limb cooling; and 4) hypoxia with limb cooling. During rest and muscle function tests, hypoxia was achieved by subjects breathing normobaric air with an oxygen concentration of 13.5% equivalent to an altitude of 3750 metres. Limb cooling was achieved by the application of a cold water (<5 °C) perfused cuff to the knee extensors. Maximal voluntary muscle function was assessed in the following order: peak torque during three isometric actions; peak torque during three isokinetic concentric (180°/s) actions; mean peak torque during two sets of 50 repetitive isokinetic concentric actions (180°/s) separated by 10 minutes of seated passive rest. Data were analysed for two main effects (i.e. hypoxia versus normoxia and cold versus neutral) and their potential interaction by repeated measures ANOVA. No significant interaction effects were revealed, therefore pooled data are presented. Haemoglobin oxygen saturation assessed by pulse oximetry was significantly reduced (p<0.01) during hypoxia (mean ± SEM: 90 ± 0.8%) versus normoxia (98 ± 0.1%). Mid-anterior thigh skin temperature was significantly reduced (p<0.01) during cold (14.1 ± 1.2°C) versus neutral (30.7 ± 0.3°C). Isometric strength was not significantly affected (p>0.05) by either hypoxia or cold. Concentric strength was unaffected (p>0.05) by hypoxia but significantly reduced (p<0.01) during cold (150 ± 8 Nm) versus neutral (166 ± 6 Nm). Mean peak torque during the first set of 50 repetitions was unaffected (p>0.05) by hypoxia but significantly reduced (p<0.01) during cold (115 ± 4 Nm) versus neutral (124 ± 5 Nm). Mean peak torque during the second set of 50 repetitions was unaffected (p>0.05) by hypoxia and cold. Our results confirm that limb cooling significantly reduces maximal voluntary dynamic muscle function (Bergh and Ekblom, 1979), whereas function is preserved during moderate hypoxia (Young et al., 1980). Uniquely, these results reveal no interactive effects of limb cooling and hypoxia equivalent to 3750 metres altitude on maximal voluntary muscle function.