Human locomotion has been a part of scientific studies for a long time. Its energetics, biomechanics and pathologies are the focus of both anthropology and medicine. Crouched walking is a special form of human locomotion, practiced for hunting, foraging, or traversing a difficult terrain. This thesis, using 12 adult male participants, focuses on analyzing the loading of the crus during crouched walking using a computed musculoskeletal modeling method and simulation to identify present forces and moments, especially in the shin bone and calf muscle. According to the simulation, loading of the crus during crouched walking was estimated to be higher than in normal walking, with approximately twice higher moments in dorsal and lateral parts of tibial midshaft cross-section, and force generated by calf muscles was estimated to be approximately 16 % higher. These findings were compared to recent studies of bone reaction to loading, of pathologies of the crus associated with crouched walking in patients affected by cerebral palsy and of the connection between crouched walking and evolution of bipedalism.