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Biomechanical Analysis of the Tibiofemoral Joint and Lower Leg JOO SUNG YI, SOO MIN KANG, CHAN YOUNG JOUNG, Choice Research Group — The knee is a two-joint structure composed of the tibiofemoral joint and the patellofemoral joint. Using the free body of diagram of forces acting on the knee during loading, biomechanical model depicting knee joint kinematics has been studied. Moment equilibrium and force equilibrium are also considered. For a stability analysis, the joint reaction force of the femur and the forces required to hold the lower leg in static equilibrium are calculated, in consideration to the weight of the lower leg and center of gravity of the lower leg from the knee joint. Based on the fact that magnitude of the joint reaction force on knee joints can reach several times the body weight, the stability analysis of the knee and lower leg bone have been carried out. The purpose of the research is to evaluate stress and fracture conditions in the tibia by using biomechanical analysis. This research includes two procedures: Study of mathematical modeling of the lower leg using kinematics, and the development of static analysis of the tibial bone. The physiological solutions of the bones and conditions causing the fracture in the bone can be found by using the presented procedure.

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