The collective dynamics of Brownian particles in porous structures is an important topic for both theory and experiment. A good understanding of Brownian dynamics of interacting particles moving in one dimension has recently been achieved in several models. The theoretical description of these models focuses on infinitely large systems, although real systems are in usually small. This thesis studies the effect of the size of a system of interacting particles driven by a force on their transport behavior in a periodic potential. We have used simulations of a single-particle model with analytically solvable results as reference data. For this model, simulations were performed using the Euler–Maruyama method. Multi-particle simulations were performed for two different types of particle interactions. The rigid-ball type interaction served as the basis for the analysis of behavior of a smoothed-barrier type interaction potential case that allowed for the particles to pass through each other. The particle velocity and diffusion coefficient were studied as a function of various system parameters such as particle softness, size, and density or system size.