Objective To investigate the levels of 25-hydroxyvitamin D (25(OH)D) and effects of additional cholecalciferol intake on endothelial function and blood pressure (BP) in case of chronic stress-induced arterial hypertension (AH) in rats. Materials and methods. This study was performed on 136 adult wild type male rats with body weight ranged between 200-250g. Rats were placed in the condition of overpopulation for 4 months that led to development of stress-induced AH in the majority of rats by the end of this period. In order to investigate the role of vitamin D on the mechanisms underlying AH development, rats were administered with cholecalciferol (2500 MU/day) during all the period of overpopulation experiment. We estimated therapeutic effects of cholecalciferol on BP levels and endothelial function that was evaluated using blood levels of nitric oxide and acetylcholine-dependent vasodilatation. As the control we used hypertensive rats who did not consume cholecalciferol and healthy animals. Results Development of stress-associated AH was accompanied with suppressed endothelial vascular function that was expressed as reduction of NO concentration in blood and endothelium-dependent vasodilatation after acetylcholine administration. Use of cholecalciferol (2500 MU/day) in hypertensive rats led to reduction of average BP levels, and improved the characteristics of endothelial function and increased NO production. Conclusion Long-term administration of cholecalciferol (2500 MU/day) to hypertensive rats leads to normalization of hemodynamic parameters and improves the characteristics of endothelial function. The results of our study demonstrate that cholecalciferol can become an important additional component of antihypertensive therapy, but it requires further detailed studies. Key words Arterial hypertension, cholecalciferol, nitric oxide, endothelium-dependent vasodilatation, vitamin D.