Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38.

UK Prospective Diabetes Study Group.


OBJECTIVE: To determine whether tight control of blood pressure prevents macrovascular and microvascular complications in patients with type 2 diabetes. DESIGN: Randomised controlled trial comparing tight control of blood pressure aiming at a blood pressure of <150/85 mm Hg (with the use of an angiotensin converting enzyme inhibitor captopril or a beta blocker atenolol as main treatment) with less tight control aiming at a blood pressure of <180/105 mm Hg. SETTING: 20 hospital based clinics in England, Scotland, and Northern Ireland. SUBJECTS: 1148 hypertensive patients with type 2 diabetes (mean age 56, mean blood pressure at entry 160/94 mm Hg); 758 patients were allocated to tight control of blood pressure and 390 patients to less tight control with a median follow up of 8.4 years. MAIN OUTCOME MEASURES: Predefined clinical end points, fatal and non–fatal, related to diabetes, deaths related to diabetes, and all cause mortality. Surrogate measures of microvascular disease included urinary albumin excretion and retinal photography. RESULTS: Mean blood pressure during follow up was significantly reduced in the group assigned tight blood pressure control (144/82 mm Hg) compared with the group assigned to less tight control (154/87 mm Hg) (P<0.0001). Reductions in risk in the group assigned to tight control compared with that assigned to less tight control were 24% in diabetes related end points (95% confidence interval 8% to 38%) (P=0.0046), 32% in deaths related to diabetes (6% to 51%) (P=0.019), 44% in strokes (11% to 65%) (P=0.013), and 37% in microvascular end points (11% to 56%) (P=0.0092), predominantly owing to a reduced risk of retinal photocoagulation. There was a non–significant reduction in all cause mortality. After nine years of follow up the group assigned to tight blood pressure control also had a 34% reduction in risk in the proportion of patients with deterioration of retinopathy by two steps (99% confidence interval 11% to 50%) (P=0.0004) and a 47% reduced risk (7% to 70%) (P=0.004) of deterioration in visual acuity by three lines of the early treatment of diabetic retinopathy study (ETDRS) chart. After nine years of follow up 29% of patients in the group assigned to tight
control required three or more treatments to lower blood pressure to achieve target blood pressures. CONCLUSION: Tight blood pressure control in patients with hypertension and type 2 diabetes achieves a clinically important reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy, and deterioration in visual acuity.