

Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study.

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BMJ. 2000 Aug 12; 321(7258): 405–12.

OBJECTIVE: To determine the relation between exposure to glycaemia over time and the risk of macrovascular or microvascular complications in patients with type 2 diabetes. **DESIGN:** Prospective observational study. **Setting:** 23 hospital based clinics in England, Scotland, and Northern Ireland. **Participants:** 4585 white, Asian Indian, and Afro-Caribbean UKPDS patients, whether randomised or not to treatment, were included in analyses of incidence; of these, 3642 were included in analyses of relative risk. **OUTCOME MEASURES:** Primary predefined aggregate clinical outcomes: any end point or deaths related to diabetes and all cause mortality. Secondary aggregate outcomes: myocardial infarction, stroke, amputation (including death from peripheral vascular disease), and microvascular disease (predominantly retinal photo-coagulation). Single end points: non-fatal heart failure and cataract extraction. Risk reduction associated with a 1% reduction in updated mean HbA(1c) adjusted for possible confounders at diagnosis of diabetes. **RESULTS:** The incidence of clinical complications was significantly associated with glycaemia. Each 1% reduction in updated mean HbA(1c) was associated with reductions in risk of 21% for any end point related to diabetes (95% confidence interval 17% to 24%, $P<0.0001$), 21% for deaths related to diabetes (15% to 27%, $P<0.0001$), 14% for myocardial infarction (8% to 21%, $P<0.0001$), and 37% for microvascular complications (33% to 41%, $P<0.0001$). No threshold of risk was observed for any end point. **CONCLUSIONS:** In patients with type 2 diabetes the risk of diabetic complications was strongly associated with previous hyperglycaemia. Any reduction in HbA(1c) is likely to reduce the risk of complications, with the lowest risk being in those with HbA(1c) values in the normal range (<6.0%).