

Altered postprandial responses in type 2 diabetes

N. Mohanlal, R.R. Holman

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Background and Aims: People with type 2 diabetes are at increased risk of coronary heart disease (CHD), which may in part be due to altered postprandial metabolic responses. Alterations in lipoprotein clearance have been demonstrated in diabetic patients with fasting hypertriglyceridaemia, however a standardised method of examining postprandial lipaemia is not available. We have developed an Oral Triglyceride Tolerance Test (OTTT) which has been used to investigate post challenge metabolic changes in patients with stable type 2 diabetes.

Materials and Methods: A 200 ml test drink containing 50g long chain triglyceride emulsion and 50g maltodextrin was administered to 30 type 2 diabetic subjects treated with diet alone (n=10), sulphonylurea (n=10), or metformin (n=10) and 20 non-diabetic subjects. Plasma lipid profiles, non-esterified fatty acid (NEFA), glycerol, glucose and insulin levels were measured fasting and post challenge two hourly for eight hours.

Results: The diabetic and non-diabetic subjects were, respectively, mean (SD) age 55.5 (7.4) and 52.1 (9.0) years, BMI 32.7 (6.2) and 27.9 (5.6) kg/m², geometric mean (1SD range) triglyceride 1.47 (0.91 to 2.4) and 0.80 (0.52 to 1.25) mmol/L with, in the diabetic subjects, mean HbA1c 7.6 (1.2) % and fasting plasma glucose 9.1 (2.7) mmol/L. Diabetic subjects exhibited significantly higher geometric mean triglyceride levels at all time points compared to non-diabetic subjects, the greatest difference being at six hours (1.96 (1.2 to 3.3) vs 1.05 (0.6 to 1.8) mmol/L, p=0.0002). Six hour triglyceride correlated strongly with fasting triglyceride (r=0.89, p<0.0001) and incremental triglyceride AUC correlated with fasting plasma glucose (r=0.28, p=0.043). Diabetic subjects had higher mean glycerol at six hours (13.4 (5.5) vs 9.3 (2.0) mg/dL, p<0.002) and higher incremental mean AUC NEFA (p<0.01). Post challenge geometric mean insulin levels were highest (peak 300.3 (184.5 to 488.7) vs 192.4 (90.4 to 409.5) pmol/L, p=0.025) at two hours and more prolonged in diabetic subjects, but returned to baseline by eight hours.

Conclusions: Exaggerated post challenge triglyceride, glycerol, NEFA and insulin changes are evident even in patients with moderately well-controlled type 2 diabetes. Metabolic abnormalities in the postprandial state may contribute, through accelerated atherogenesis, to the increased risk of CHD seen in these individuals.