ABSTRACT
The effect of manganese deficiency on insulin binding, glucose transport and metabolism in isolated adipose cells from Sprague-Dawley rats was investigated. Offspring from Mn-sufficient female rats fed 45 micrograms Mn/g diet (control) and from Mn-deficient (Mn-) female rats fed 1 microgram Mn/g diet were used in these studies. Both basal and insulin-stimulated 3-O-methylglucose transport in isolated adipose cells was significantly lower in Mn- rats, averaging 40% and 50% of control values, respectively. Kinetic analysis of glucose transport demonstrated a lower maximal transport velocity (Vmax) for glucose in adipose cells from Mn- rats compared to controls. No differences in the Km for glucose uptake were observed between the two groups. Insulin-stimulated glucose oxidation to CO2 and conversion to triglycerides was lower in isolated adipose cells from Mn- rats compared to controls. Mn- animals had fewer insulin receptors per cell compared to controls, although no differences in insulin receptor affinity were observed between the two groups. These data suggest that Mn deficiency affects glucose transport and metabolism in the adipose cell. The apparent defect lies distal to the insulin receptor and probably reflects a decreased number of glucose transporters in adipose tissue of Mn- rats.