OBSERVATIONS

Maternal Metabolic Control and Perinatal Outcome in Women With Gestational Diabetes Mellitus Treated With Lispro or Aspart Insulin

Comparison with regular insulin

Gestational diabetes mellitus (GDM) is associated with increased risk of maternal and neonatal morbidity with macrosomia being the most common neonatal complication (1). The risk of macrosomia and/or disproportionate fetal growth is closely related to 1-h postprandial glucose concentration (2).

Therefore, the treatment of GDM should be aimed at normalizing maternal glycemia including the early postprandial response. Insulin therapy is needed whenever strict normoglycemia cannot be achieved by medical nutritional therapy alone (3). Because of their pharmacokinetic properties, short-acting insulin analogs (Insulin Aspart [ASP] and Insulin Lispro [LIS]) could be more effective in pregnancy than human regular insulin (HI) (4). Nevertheless, data comparing the effects of ASP or LIS with those of HI on pregnancy outcome in GDM women are still limited (5–7). Moreover, no study has compared the individual effects of the two insulin analogs. We report the results of a prospective randomized trial designed to evaluate the pregnancy outcome in GDM women receiving ASP, LIS, or HI.

We studied 96 women with GDM diagnosed according to Carpenter and Coustan's criteria at 27.5 ± 1.1 weeks of gestation and on diet treatment (30 kcal/kg: 50% carbohydrate, 20% protein, and 30% fat). Women who failed to achieve postprandial glycemic goals (1 h <7.2 mmol/l) were randomly allocated to ASP (n = 31), LIS (n = 33), or HI (n = 32). The three groups were comparable for age, parity, BMI, weight gain, and time of gestation. Blood glucose levels were measured five times daily, and a specialist consultancy was performed weekly to adjust insulin dosages to glycemic targets.

Bedtime NPH insulin was added in 23 HI, 18 LIS, and 16 ASP patients (dose ranging 6–10 units) because fasting glucose was ≥5.2 mmol/l.

No women experienced hypoglycemic episodes. At the end of pregnancy (38th week of gestation), no differences for the duration of insulin therapy, insulin dose, weight gain, fasting plasma glucose, and A1C were registered. On the contrary, 1-h postprandial glucose level, evaluated after a standardized breakfast (200 kcal: 67% carbohydrate, 14% fat, and 19% protein), was higher in HI patients (7.5 ± 1.3 mmol/l) than in LIS (6.6 ± 1.05 mmol/l) and ASP (6.75 ± 1.12 mmol/l) patients (ANOVA, $P < 0.05$).

Delivery occurred at the 39th week of gestation, with no differences among the three groups. However, birth weight was higher ($P < 0.04$) in HI than in LIS and ASP patients. Macrosomia resulted in 15.6% of HI, 12.1% of LIS, and 9.6% of ASP patients, but this data does not reach statistical significance.

The cranial-thoracic circumference ratio, an index that indicates disproportionate fetal growth (8), was significantly lower in the HI than in the LIS and ASP groups (ANOVA, $P < 0.03$), and 18% of newborns from HI women had cranial-thoracic circumference <1.

Our study, performed in a small cohort of women, lacks adequate statistical power; nevertheless, it suggests that both short insulin analogs are associated with better postprandial maternal glucose control and anthropometric measures in newborns than HI. Large prospective studies need to confirm that ASP and LIS are equivalent and more effective than HI in pregnancies complicated by GDM.

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