Could Blood Ketone Monitoring Be A Tool for Managing Gestational Diabetes Mellitus?

Nutritional management of gestational diabetes mellitus (GDM) is based on guidelines from diabetology societies (1). Ketonuria is often monitored, but clear management guidelines have not been established. Home-based methods of measuring ketonemia are available. We believe that it is important to evaluate the utility of this tool in GDM.

We measured ketonemia in a control population of pregnant women and a GDM population. Pregnant women were systematically screened for GDM between the 24th and 28th weeks (75-g oral glucose tolerance test [OGTT], World Health Organization guidelines). A total of 56 women (29.98 ± 4.86 years of age, prepregnancy BMI 23.14 ± 4.62 kg/m², weight gain 14.49 ± 4.93 kg) with a normal OGTT and 49 women (31.35 ± 5.39 years, prepregnancy BMI 25.96 ± 5.91 kg/m², weight gain 9.25 ± 5.52 kg) with GDM were included.

Each subject was monitored in accordance with the appropriate guidelines; in addition, the control subjects performed glycemia and ketonemia self-monitoring three times a day (upon waking and before the midday and evening meals). GDM women were also asked to measure their postprandial glycemia. All subjects measured their fasting ketonuria.

Glycemia measurement was performed using test strips and a meter (Abbott), and capillary blood ketonemia measurement was performed using Optium β-Ketone test strips and the same meter (2). The replicate analysis resulted in CVs of 3.3%. The study protocol was approved by an ethics committee.

The two groups did not differ in terms of age, but BMI and weight gain were higher in the GDM than in the control group (P < 0.01). The mean ketonemia was lower in the control than in the GDM group (0.01 ± 0.10 vs. 0.04 ± 0.009 mmol/l, P < 0.001). Fasting ketonemia did not differ between the control and GDM groups (0.01 ± 0.11 vs. 0.01 ± 0.06 mmol/l, respectively). Ketonemia values measured before the midday and the evening meal were lower for control than for GDM patients (midday 0.01 ± 0.08 vs. 0.05 ± 0.11 mmol/l, P = 0.002; evening 0.02 ± 0.09 vs. 0.05 ± 0.10 mmol/l, P = 0.005).

A ketonemic episode was defined as the unbroken period during which each day is a part of a sliding 7-day interval containing >25% of height value. Of the control subjects, 6 (12%) experienced at least one ketonemic episode (average length 10.5 days) versus 23 (47%) in the GDM group (average length 13.8 days) (a total of 37 episodes).

For women with GDM, we are not currently in a position to conclude whether their ketonemia levels have clinical significance in terms of the pregnancy outcome or the health of the child. Ketonemia values differ from those recorded in control subjects, and this difference is not irrelevant. A study needs to be performed to be certain that higher ketonemia has a detrimental prognostic significance for fetal development.

Reports from the literature have focused exclusively on ketonuria. A negative correlation between ketonuria and intellectual quotient in children born to diabetic mothers has been reported (3, 4). A relationship between high fasting ketonemia during the last trimester and delayed educational development has been suggested (5).