Pre-eclampsia, a clinical syndrome of unknown etiology, is among the most common reasons for perinatal and maternal mortality (1). The incidence of pre-eclampsia in women with type 1 diabetes is considerably higher (10–20%) than in the background population (4–5%) (2). Microalbuminuria, defined as a urinary albumin excretion from 30 to 300 mg/24 h before or in early pregnancy has proven to be a good risk marker for pre- eclampsia in women with type 1 diabetes (3). However, the urinary albumin status is often not known at booking for pregnancy. The traditional method for diagnosing microalbuminuria, collection of 24-h urine samples, is cumbersome and time consuming and may be associated with collection errors and poor compliance.

The aim of this study was to determine whether measurement of the albumin-to-creatinine ratio in random urine samples can replace 24-h urine collection in screening for micro- and macroalbuminuria in pregnant women with type 1 diabetes.

**RESULTS** — A total of 103 (86%) women had normoalbuminuria, 7 (6%) had microalbuminuria, and 9 (8%) had macroalbuminuria/nephropathy. The age, duration of diabetes, and HbA1c were 30 ± 4 years, 16 ± 7 years, and 7.6 ± 1%, with no significant differences between the groups. The urine albumin excretion (mg/24 h) was median 8 (range 0.8–30), 66 (35–196), and 677 (301–3,536), respectively. Figure 1 shows a positive correlation between the 24-h urinary albumin excretion and the albumin-to-creatinine ratio in the random urine samples (R = 0.80 and P < 0.001). A total of 15 of 16 women with an albumin excretion >30 mg/24 h had an albumin-to-creatinine ratio >2.5 mg/mmol (sensitivity 94%). All nine women with an albumin excretion >300 mg/24 h also had albumin-to-creatinine ratio >25 mg/mmol. All 103 women with an albumin excretion <30 mg/24 h had an albumin-to-creatinine ratio <2.5 mg/mmol (specificity 100%, positive predictive value 100%, negative predictive value 99%). Using 3.5 mg/mmol (30 μg/mg) as the cutoff for microalbuminuria, we found...
that the sensitivity was only 83%, while the specificity remained at 100% (positive predictive value 100%, negative predictive value 97%).

The day-to-day coefficient of variation was 40% for the 24-h urine collections and 49% for the random urine samples.

CONCLUSIONS — The use of random urine samples for screening for micro- and macroalbuminuria may ensure a better compliance. To better reflect the everyday clinical situation with outpatients, no restrictions were made as to the patients’ diet, exercise, or time or date of sampling.

The day-to-day variation of albumin-to-creatinine ratio was slightly greater than the 24-h urine collections but did not differ from that in the nonpregnant population (9). Regardless of the method of collection, this day-to-day variation makes at least two samples necessary before taking diagnostic and therapeutic actions upon elevated values.

Earlier reports have shown good correlation between urinary albumin-to-creatinine ratio and 24-h urinary excretion in screening for microalbuminuria (10,11), and guidelines (4,7) suggest that using albumin-to-creatinine ratio is valid for screening in the nonpregnant diabetic patient. Our study is the first to demonstrate that this might also be the case in pregnant women with type 1 diabetes.

However, outside pregnancy the diagnosis of microalbuminuria might still be confirmed by a 24-h urine sample. We found a cutoff value of 2.5 mg/mmol to be more successful when classifying urinary albumin excretion in random urine samples into groups of normo- and micro/macralbuminuria in comparison with 24-h collections than the cutoff value of 3.5 mg/mmol. This is probably due to a higher creatinine clearance during pregnancy. In addition, the one patient with elevated urinary albumin excretion in the 24-h collections and normal values in the albumin-to-creatinine ratio (false-negative) turned out to have normal 24-h urinary albumin excretion in the remaining part of pregnancy. However, a much larger sample size and a harder end point would have been necessary to evaluate the exact cutoff value with acceptable precision.

We conclude that measurement of the albumin-to-creatinine ratio in two random urine samples is a highly specific and sensitive method for screening for micro- and macroalbuminuria and seems to be a good alternative to collecting 24-h urine samples in pregnant women with type 1 diabetes.

![Image 1](105x540 to 331x735)

Figure 1 — Albumin-to-creatinine ratio vs. 24-h albumin excretion. Each dot represents the median of two samples. The dashed lines are the lower cutoff for microalbuminuria; 30 mg/24 h and 2.5 mg/mmol, respectively. A regression line is included; R = 0.80, P < 0.001.

References

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