

PEDIATRIC UROLOGY

Assessment of lithogenic risk in children based on a morning spot urine sample

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Purpose: The Bonn Risk Index has been used to evaluate the risk of urinary calcium oxalate stone formation. According to the original method, risk should be determined based on 24-hour urine collection. We studied whether the Bonn Risk Index could be measured in spot urine samples and which part of the day is most suitable for this purpose.

Materials and Methods: We collected total and fractionated 24-hour urine (in a 6-hour nocturnal portion and 9 consecutive 2-hour diurnal samples) in 42 children and adolescents with calcium oxalate urolithiasis and 46 controls. Bonn Risk Index values determined from each of the urine fractions were compared to those obtained from related 24-hour urine collections.

Results: Both groups exhibited similar circadian patterns of Bonn Risk Index values. Median Bonn Risk Index for the nighttime portion of urine in the stone group was 1.4 times higher than that obtained from the total 24-hour urine. The morning hours between 08:00 and 10:00 showed the peak lithogenic risk, and this fraction had the highest sensitivity and selectivity regarding discrimination between stone formers and healthy subjects. The afternoon hours demonstrated lower and less fluctuating crystallization risk. Despite diurnal fluctuations in Bonn Risk Index, there was still a well-defined cutoff between the groups.

Conclusions: Bonn Risk Index determined from urine samples collected between 08:00 and 10:00 appears optimal in separating stone formers from healthy subjects, and appears as useful as the value determined from 24-hour urine collection. Investigation of this diurnal sample simplifies diagnosis in pediatric stone disease without loss of clinical information.

Editorial Comment

The authors sought to determine whether lithogenic risk in children could be determined from a single spot urine sample as opposed to 24-hour urine collections which can be difficult to obtain in the pediatric population. They used the Bonn Risk Index (BRI) which is an estimate of spontaneous calcium oxalate crystallization risk. They collected 24-hour urine samples from 42 calcium oxalate stone forming children on one day and on the second consecutive day they collected urine samples in 2-hour intervals throughout the day. They found circadian rhythm in the median BRI values. The authors concluded that the most critical periods of time for lithogenic risk are at night and morning hours and that spot urine samples collected after breakfast would be most useful in assessing lithogenic risk. This represents a nice screening tool to identify those patients with a higher lithogenic risk who would most benefit from a more formal metabolic evaluation.

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