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Examination of Salt Intake Evaluation Method using Urine Sample

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Summary

Purpose of the Study: Adequate salt intake (SI) is necessary because excessive SI is associated with hypertension and heart failure and insufficient SI increases the risk of dehydration. Although urine samples and dietary salt questionnaires (SQ) have been used to manage SI, their assessment of SI is inadequate due to difficulties in implementation and inaccuracy. We found that SI is highly variable in chronic kidney disease (CKD) patients and that our dietary SQ is inadequate for accurate assessment of SI. Therefore, we examined the degree of variability and factors involved in the variability of SI in stored and ad libitum urine samples in CKD patients, clarified points to consider when interpreting SI using urine samples, and examined the correlation between SI using a re-created SQ and SI using urine samples. The study was conducted to determine the correlation between SI using urine samples and SI using a re-created SQ.

Methods: CKD patients in the renal outpatient clinics of our hospital and four affiliated hospitals were included in the study. We collected 24-hour urine storage and ad libitum urine samples from CKD patients at each visit from October 2022 to April 2023, and calculated salt intake over time using old and new SQ. Daily SI was calculated using the urinary salt excretion rate based on 24-hour urine storage in the urine storage method, the Tanaka's formula using urine samples in the urine collected at any time, and the questionnaire in the SQ method. Daily SI was calculated at least twice in the same CKD patient by urine storage, urine at any time, and the SQ, and the range of variation was evaluated. Seasonal involvement was also examined as a factor involved in the variability. In the same CKD patients, we compared SI in urine at any time and in the conventional and revised SQs to that in urine storage.

Results: A total of 173 CKD patients (age: 61.9 ± 14.7 years, gender: 96 males) were enrolled. Median (quartile) renal function was estimated glomerular filtration rate (eGFR) 47.0 mL/min/1.73m^2 (31.8-63.3). The SI per SI assessment method was 8.51 ± 3.45 g/day for urine storage, 9.13 ± 2.58 g/day for urine at any time, 7.99 ± 1.99 g/day for the conventional SQ, and 5.90 ± 1.96 g/day for the revised SQ. Compared to the conventional SQ, the revised SQ showed significantly lower values. Correlation of SI by SI assessment method showed a higher correlation with urine storage in the revised SQ than in the conventional SQ. In a month-by-month comparison of SI, SI tended to be lower in April than in other months.

Discussion: The present study was conducted only six months after the data collection, and it is not yet possible to conclude the usefulness of the revised SQ or to evaluate the effect of the changes in SI. Nevertheless,

it is interesting to note that a more pronounced correlation was found between urine storage and SI using the revised SQ, and that in terms of variation in SI, there was a trend toward lower SI in April compared to winter. In addition to seasonal variations, we would like to continue to identify related factors such as gender, body size, and renal function. In addition, we hope that a new SQ that corrects for body size will provide a more accurate estimate of SI.