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The Inventive study on Sodium Intake Estimation in hospital patient using Photographs based on Artificial Intelligence

JIWON RYU[1], Hye Won Kim[1], Sejoong Kim[2]
[1]Department of Internal Medicine, Seoul National University Bundang Hospital, Korea, Republic of
[2]Department of Internal Medicine-Nephrology, Seoul National University Bundang Hospital, Korea, Republic of

Objectives: Measuring sodium intake in hospitalized patients is critical to their care. Our aim was to evaluate the use of AI-based images for determining sodium intake in these patients.

Methods: A prospective validation study was conducted, Based on the information of the already investigated nutrients and quantity of food, the consumed nutrients were analyzed through photos taken before and after the meal. The You Only Look Once (YOLO) based models and convolutional neural networks including ResNet-101 were used to detect and classify food and dish areas, and to classify food quantity, respectively. The 24-hour urine sodium value was measured as a reference for evaluating sodium intake.

Results: Total 54 participants were enrolled, but 25 participants were analyzed. The results showed that the median intake of sodium with the AI algorithm was 1756.5 mg and the total intake of sodium was 2022.7 mg. The 24-hour urine sodium showed a significant relationship with total intake (including AI-Na) and eGFR. However, there was an absolute difference between the AI-Na value and the gold standard of sodium intake, which is 24-hour urine sodium. A formula using regression with interaction term could be derived considering the actual patient environment, such as gender, age, renal function, diuretics, and fluid, and it can be argued that AI-Na has clinical significance. It is estimated that about 0.535 of the total input corresponds to the 24h-UNa value in the non-diuretic group, while in the diuretic group, it corresponds to about 2.355 of the total input.

Conclusions: The study highlights the potential of AI-based images in determining sodium intake in hospitalized patients.

AI algorithm for food classification