



Abstract Type : Poster exhibition

Abstract Submission No.: A-0167

Abstract Topic : Non-dialysis CKD

Artificial intelligence-driven predictive model linking food features to chronic kidney disease development

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Objectives : Recent developments in artificial intelligence (AI) have revolutionized medical research by enabling more accurate, efficient, and tailored methodologies. This study explored the relationship between dietary intake and the development of chronic kidney disease (CKD) using AI models.

Methods : Using Korean Genome and Epidemiology Study cohort data, the dietary intake of 57,213 participants was assessed using a validated food frequency questionnaire, and 106 food items were categorized into 21 food groups. Machine learning models, including Support Vector Machine, Random Forest, Gradient Boosting Classifier (GBC), Gaussian naïve Bayes, logistic regression, and multilayer perceptron were employed to predict CKD incidence using two datasets: one with basic clinical features and the other incorporating both clinical and food group features.

Results : GBC achieved the highest accuracy of 0.8615 when food features were included, highlighting the role of dietary components in CKD prediction. Shapley additive explanation analysis revealed that baseline estimated glomerular filtration rate, age, diabetes mellitus, and food features, such as other grains and mushrooms, influenced CKD risk.

Conclusions : This study emphasizes the utility of AI in identifying the complex interactions between food intake and CKD risk, paving the way for personalized dietary recommendations for CKD prevention.