

BACKGROUND

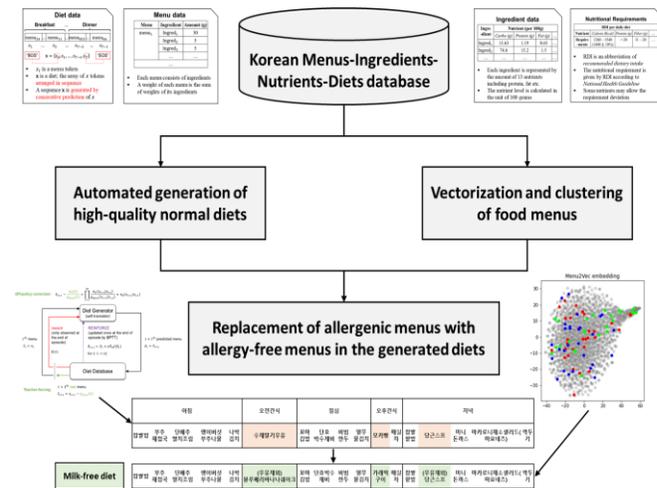
- Providing an allergen-eliminated diet plan with adequate nutrition requirement is a significant daily challenge to caregivers of children with food allergies (FA).
- We developed a state-of-the-art artificial intelligence (AI) solution for diet planning^{1,2}, which is able to generate high-quality diets that satisfy the composition among food items and recommended daily intake (RDI)

OBJECTIVE

- We extended our AI solution for diet planning to be specialized to the problem of allergy-free diet planning for children with FA and investigated its effects.

METHODS

Development of the AI solution for allergy-free diet planning



METHODS (CONT.)

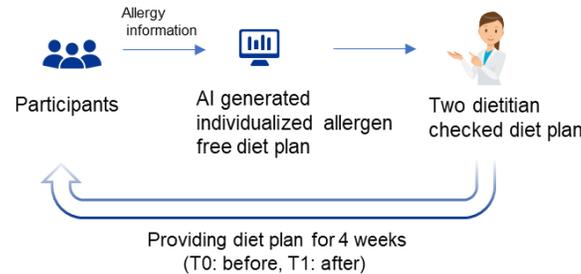
Example of AI-generated allergen-free daily diet plans

e.g.) Egg whites, cow's milk, peanut, soybean, wheat, tree nut-free diet

	Morning	Morning snack	Lunch	Lunch snack	Dinner
Mon	Multi-grain rice Potato soup Fried yellow croaker Perilla herb	Porridge (sesame vegetable) High-calcium Orange juice	Shimp fried rice Perilla mushroom soup Chicken boiled white fish	Sweet pumpkin rice cake Grape juice	Multi-grain rice Chicken soup smoked duck Paprika
Tue	Multi-grain rice Cabbage soup Chicken breast and potato Perilla leaf	Plum juice	Multi-grain rice Mushroom stew Pork Bossam Cucumber salad	Melon High-calcium orange juice	Bulgogi rice Seaweed soup Fried vegetables Salad
...			...		

Daily diet plan sufficient for RDI of 14 nutrients. Nutrient information of diet plans were also provided to subjects.

Clinical trial



- Measurements
Food Allergy Quality of Life-Parental Burden (FAQL-PB)
Food Allergy Quality of Life Questionnaire-Parental Form (FAQLQ-PF), Food Frequency Questionnaire (FFQ),
Food Allergy Self-Efficacy scale for parents (FASE-P)

Analysis

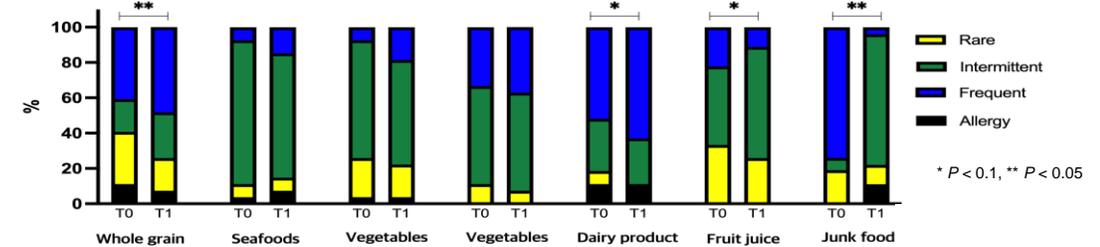
- FFQ was defined to be rare, intermittent (once a month to 2-4 time per week), and frequent (5-6 times per week to three times a day)
- Pairwise t-test and McNemar test were used to analyze data
- Qualitative data were also analyzed using the analysis of reviews

RESULTS

Table 1. Characteristics of the study participants (N=66)

Variables	Result	Variables	Result
Age of children, yr	7.4 ± 0.9	Number of restricted foods	2.7 ± 2.0
Age of caregiver, yr	40.7±6.9	FAQL-PB	3.4 ± 1.5
Co-allergic disease, N (%)		FAQLQ-PF	64.3 ± 40.4
Atopic dermatitis	27 (41.5)	FASE-P	76.8 ± 15.7
Asthma	3 (4.6)	Number of combination of allergen	55
Allergic rhinitis	26 (40)		

Figure 1. Change of food frequency intake after receiving personalized allergen-free diet plans



- FASE-P was significantly increased after intervention ($P=0.03$), whereas the difference of FAQL-PB and FAQLQ-PF did not show a significant change before and after providing personalized allergen-free diet plan.

Caregivers who care children with multiple food allergy said

"I have been struggling on my own, and this service was very helpful."
"I didn't know that it is actually possible to provide efficiently a variety of nutritional diets with various ingredients even for children with food allergies!"

CONCLUSIONS

- We originally show the feasibility of providing personalized allergen-free diet plans using the AI solution collaborated with physicians, engineers, and dietitians within a relatively short time
- Further research is needed to investigate the effect of nutrition management by the AI on QoL, self-efficacy, and dietary intakes in families with food allergy