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Original Article

Artificial Intelligence-Generated Diet Plans for Hypertension and Dyslipidemia: Adherence and Nutritional Insights

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Abstract

Background: We evaluated diet plans generated by ChatGPT for hypertension and dyslipidaemia.

Methods: In October 2024, ChatGPT was used to generate meal plans for 24 simulated patients with different cardiovascular health problems. Data were used from men (n=12) and women (n=12), aged 56 yr, with mean heights of 176 cm and 161 cm respectively. Weight categories were based on BMI: normal, overweight, and obese, using weights of 56, 71, and 84 kg for women and 67, 85, and 101 kg for men. Four health conditions were assessed: hypertension stages 1 and 2 (systolic BP 130-139 mm Hg and ≥140 mm Hg; diastolic BP 80-89 mm Hg and ≥90 mm Hg), and elevated LDL levels (≥130 mg/dL and ≥160 mg/dL). Menus were evaluated for adherence to Mediterranean and DASH diets, including recommendations.

Results: Adherence to the Mediterranean and DASH diets was low across all groups, with median scores below 9 and 4.5, respectively. Common recommendations included weight loss, physical activity, reduced salt intake, stress management, and omega-3s for both hypertension and LDL reduction. Plant sterols/stanols were suggested only for LDL. No advice was given on smoking or alcohol use. Nutrient content did not differ significantly between hypertension and LDL menus ($P>0.05$).

Conclusion: This pioneering study found that AI-generated dietary models had low adherence to DASH and Mediterranean diets, though most recommendations were generally appropriate. Since the prompts only requested basic nutrition plans, future research should use more specific, personalized prompts to better assess AI's role in managing chronic diseases.

Keywords: Hypertension; Dyslipidaemia; Artificial intelligence; Nutrition

Introduction

Cardiovascular diseases remain the most important cause of mortality in the world. Ischaemic heart disease and stroke account for 50% and 35% of deaths from cardiovascular diseases, respectively (1). Dyslipidaemia and hypertension are involved in the pathophysiology of these diseases (2). In addition, lifestyle habits are among the most important causes of these diseases. More than 90% of the risk of CVD development is caused by modifiable risk factors (3). Habits such as nutrition, smoking, and sleep are among the modifiable risk factors (4).

In addition to pharmacological treatment, lifestyle changes are used in the treatment of cardiovascular diseases (5). One of the most important lifestyle changes is nutrition. In CVD management, the American Heart Association recommends adjusting energy intake and expenditure

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for a healthy body weight, increasing the consumption of vegetables, fruits, whole grains, choosing healthy protein sources, using vegetable oils, preferring minimally processed foods instead of overly processed foods, keeping the consumption of beverages and foods containing added sugar to a minimum, choosing foods containing little or no salt, and limiting alcohol consumption (6). Mediterranean and Dietary Approaches to Stop Hypertension (DASH) diet models, which include these dietary recommendations, are used in CVD management (7).

Nowadays, the use of artificial intelligence (AI) applications that enable personalised programmes in healthcare is rapidly increasing (8). ChatGPT, an AI-supported chatbot used in this context, is designed to respond to a variety of questions and topics ranging from simple questions to complex discussions (9). In a study examining the dietary recommendations given by ChatGPT for chronic diseases, the responses were 71.4% acceptable for dyslipidaemia and 66.7% acceptable for arterial hypertension (10). In another study, ChatGPT has the potential to provide personalised nutrition recommendations in conditions such as obesity, type 2 diabetes and cardiovascular disease (11). However, in the literature, the content of the diet recommended by artificial intelligence for blood pressure and dyslipidaemia has not been evaluated based on Mediterranean and DASH diet models. In line with all this information, we aimed to examine the diet plans prepared by ChatGPT application for hypertension and dyslipidaemia.

Methods

Study plan

In October 2024, menu plans were generated using 24 prompts entered into ChatGPT-4o for simulated individuals (age 56; 12 males, 12 females; sedentary), with height (M: 176 cm, F: 161 cm) and weights (F: 56, 71, 84 kg; M: 67, 85, 101 kg) representing normal, overweight, and obese BMI categories, and four health conditions considered: hypertension stage 1 (130–139/80–89 mm Hg), stage 2 (≥140/≥90 mm Hg) (12), and elevated LDL levels (≥130 mg/dL and ≥160 mg/dL) (13), with no human participants and no weight loss goals specified. Moreover, the prompts did not incorporate cultural dietary preferences. This study did not involve real human participants. All data used were simulated individuals. No human subjects research was conducted, so ethics approval and informed consent were not required. Examples for the entered prompts are given below:

- Can you prepare a nutrition plan for a 56-year-old female individual who is 161 cm tall and 71 kg sedentary and has systolic blood pressure 135 mm Hg and diastolic blood pressure 82 mm Hg?
- Can you prepare a nutrition plan for a 56-year-old sedentary female individual with a height of 161 cm and a weight of 56 kg and an LDL cholesterol level of 180 mg/dL?

Assessment of adherence to the Mediterranean and DASH diets

To assess adherence to the Mediterranean diet, Ruggeri et al has validated and shown that this questionnaire (MedQ-Sus) is a valid and rapid assessment tool in all population groups and may also be useful for assessing the nutritional sustainability of the diet. In this questionnaire, each food group (cereals and cereal products, legumes, fresh vegetables, fresh fruit, dairy products, fish and fish products, meat and meat products and olive oil) is assigned a quantitative score (between 0 and 2) according to the characteristics of the Mediterranean diet. The total Mediterranean diet score ranged from 0 (no adherence) to 16 (high adherence) and was divided into three classes on the basis of the tertiles of the score distribution: low adherence = 0.0-9.0, moderate adherence = 9.1-11.0 and high adherence = 11.1-16.0 (14).

The DASH diet score was developed by Mellen et al. to measure adherence to the DASH diet. In this scoring, 9 nutrients (fat, saturated fat, protein, cholesterol, fibre, magnesium, calcium, sodium and potassium) are evaluated. The scoring can take values between 0-9 and can be used in both men and women. People receive 1 point if they meet the targets of the DASH diet score and 0.5 points if they meet the intermediate targets.

As a result of the evaluation, a score of 4.5 and above is an indicator of compliance with the DASH diet (15).

Statistical analysis

The menu plans written by ChatGPT were entered into the Nutrition Information System (Ebispro for Windows, Germany; Turkish version/BeBiS 8.1) computer package programme and the average daily energy, macro and micronutrient amounts of the menu plans were calculated. The obtained data were statistically evaluated using SPSS 28.0 (IBM Corp., Armonk, NY, USA). Statistical significance was accepted as $P<0.05$ in all analyses. Median and minimum-maximum values were included in descriptive statistics. Mann Whitney U test was used for paired group analyses and Kruskal Wallis test was used for more than two group analyses. Partial eta squared and Cohen's d was used as a measure of effect size for analysis (16).

Results

Diet plans generated by ChatGPT-4o for 24 individuals (12 women, 12 men) -including 12 with hypertension and 12 with high LDL- were analysed, with equal distribution across normal weight, overweight, and obese categories (n=8 each). Table 1 presents DASH and Mediterranean diet scores for these menus. Mediterranean diet scoring revealed highest adherence in fresh vegetables, fresh fruits, and fish categories, and lowest in cereals, legumes, and dairy. For the DASH diet, protein intake scored highest, while total fat, saturated fat and cholesterol, sodium, and calcium scored lowest.

Table 1: DASH and Mediterranean diet adherence scores by disease status

	For blood pressure	For dyslipidaemia	Total
Components of the Mediterranean diet			
Cereals & cereal products (including whole, sweets excluded) (>1.5 portion/day, 2 scores)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Legumes (>2 portion/week, 2 scores)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Fresh vegetables (>2.5 portion/week, 2 scores)	2.00 (2.00-2.00)	2.00 (2.00-2.00)	2.00 (2.00-2.00)
Fresh fruits (>2 portion/week, 2 scores)	2.00 (2.00-2.00)	2.00 (2.00-2.00)	2.00 (2.00-2.00)
Dairy products (<1 portion/day, 2 scores)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Fish and fish products (>2.5 portion/week, 2 scores)	2.00 (2.00-2.00)	2.00 (2.00-2.00)	2.00 (2.00-2.00)
Meat and meat products (<1 portion/day, 2 scores)	1.00 (0.00-1.00)	0.00 (0.00-1.00)	0.50 (0.00-1.00)
Olive oil (about 4–5 spoons/day, 2 scores)	1.00 (1.00-1.00)	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Components of the DASH diet			
Protein (≥18% of total daily energy, 1 score)	1.00 (1.00-1.00)	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Total Fat (≤27% of total daily energy, 1 score)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Saturated Fat (≤6% of total daily energy, 1 score)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Cholesterol (≤71.4 mg/1000 kcal/day, 1 score)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Fiber (≥14.8 g/1000 kcal/day, 1 score)	0.50 (0.50-1.00)	0.50 (0.50-1.00)	0.50 (0.50-1.00)
Sodium (≤1143 mg/1000 kcal/day, 1 score)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)
Magnesium (≥238 mg/1000 kcal/day, 1 score)	0.50 (0.50-0.50)	0.50 (0.50-0.50)	0.50 (0.50-0.50)
Calcium (≥590 mg/1000 kcal/day, 1 score)	0.00 (0.00-0.50)	0.50 (0.00-0.50)	0.00 (0.00-0.50)
Potassium (≥2238 mg/1000 kcal/day, 1 score)	0.50 (0.50-1.00)	0.50 (0.50-0.50)	0.50 (0.50-1.00)

As shown in Fig. 1, the median total scores for both diets fell below their respective low adherence thresholds (Mediterranean <9; DASH <4.5) across all groups.

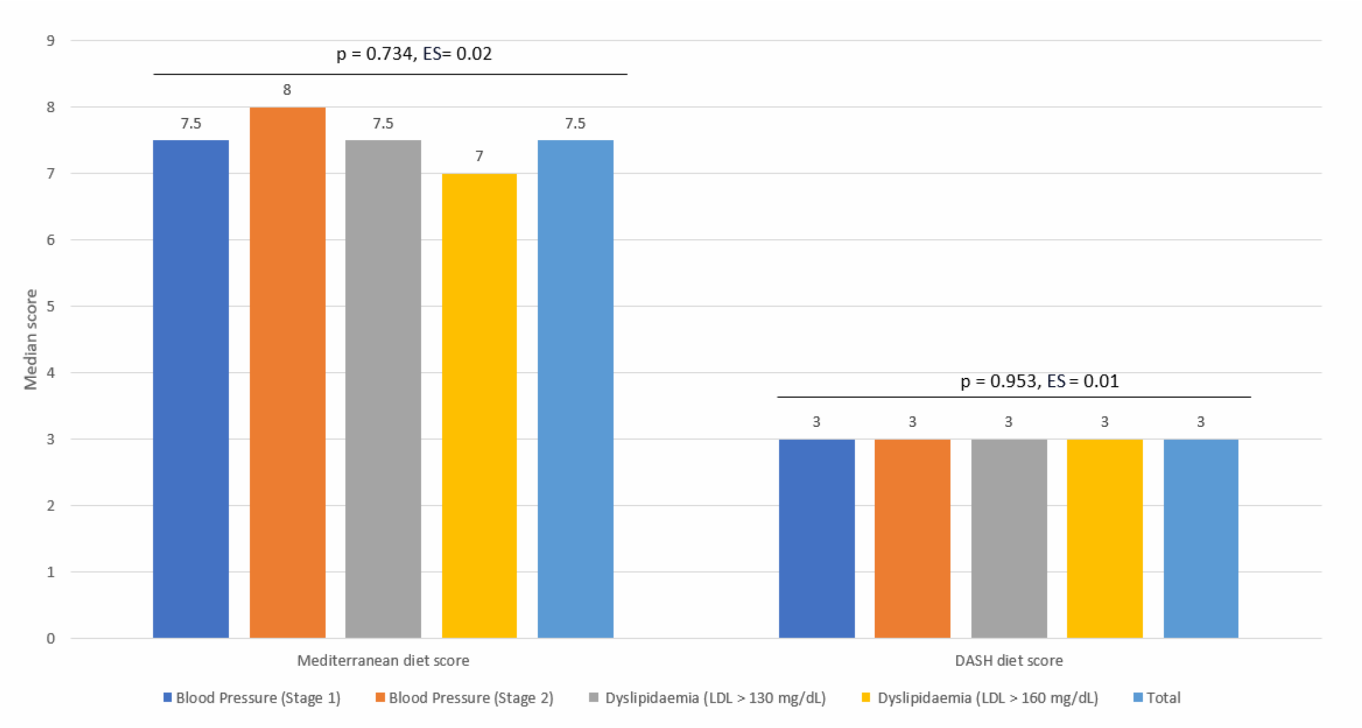

Fig. 1: Distribution of total scores of DASH and Mediterranean diet adherence by disease status
*ES: Effect size

In addition to the menu plan, ChatGPT-4o provides some recommendations specific to each disease state. Table 2 summarises these recommendations. When the table is analysed, weight loss if necessary, increasing physical activity, reducing salt consumption, stress management and omega 3 intake are among the recommendations for both hypertension and lowering LDL levels. The intake of plant sterols and stanols is recommended only for lowering LDL levels. On the other hand, he did not make any recommendations regarding smoking cessation and moderate alcohol use.

The median energy content of the menu plans was 2278.2 (1948.3-2650.1) kcal and the median values of the percentages of energy from carbohydrate, protein and fat were 24.0 (21.0-27.0), 22.0 (19.0-25.0) and 54.0 (49.0-58.0), respectively. The median values of the percentage of energy from saturated fat and cholesterol intakes were 13.0 (11.9-13.9) and 436.4 (420.5-503.2), respectively. However, no significant difference was found between the menu plans for hypertension and LDL levels for all nutrients (Table 3).

Table 2: Recommendations from the artificial intelligence based on disease status

	For Blood Pressure (Stage 1)	For Blood Pressure (Stage 2)	For Dyslipidaemia (LDL > 130 mg/dL)	For Dyslipidaemia (LDL > 160 mg/dL)
Lifestyle modification				
Weight loss (if necessary)	✓	✓	✓	✓
Physical activity	✓	✓	✓	✓
Smoking cessation				
Alcohol moderation				
Salt consumption	✓	✓	✓	✓
Stress management	✓	✓	✓	✓
Omega 3 intake	✓	✓	✓	✓
Plant sterols and stanols intake			✓	✓
Reduction of saturated fat and trans fatty acid intake	✓	✓	✓	✓

Table 3: Distribution of energy and nutrients according to disease status

Variable	For blood pressure	For dyslipidaemia	*P*	ES*
Energy and nutrients				
Energy (kcal)	2257.2 (1948.3-2650.1)	2297.7 (2091.1-2565.8)	0,862	0.04
Carbohydrate (g)	131.3 (122.7-150.6)	131.5 (112.8-149.9)	0,751	0.06
Carbohydrate (%)	24.5 (21.0-27.0)	24.0 (22.0-26.0)	0,860	0.04
Fiber (g)	30.1 (26.6-36.4)	30.8 (27.6-37.1)	0,686	0.08
Protein (g)	109.1 (103.4-144.5)	119.8 (105.1-141.1)	0,63	0.11
Protein (%)	21.5 (19.0-25.0)	22.0 (19.0-24.0)	0,591	0.11
Fat (g)	135.4 (110.6-171.4)	132.2 (128.2-152.3)	0,954	0.01
Fat (%)	54.0 (49.0-58.0)	54.0 (49.0-57.0)	0,661	0.09
Saturated fat (g)	32.4 (29.1-38.6)	32.4 (30.6-36.3)	0,885	0.03
Saturated fat (%)	13.1 (12.1-13.9)	12.9 (11.9-13.5)	0,453	0.15
Cholesterol (mg)	436.4 (420.5-503.1)	459.7 (420.5-503.2)	0,620	0.10
Monounsaturated fatty acid (g)	53.1 (41.8-63.8)	52.2 (44.7-64.3)	0,371	0.01
Polyunsaturated fatty acid (g)	44.6 (34.1-67.4)	47.1 (37.6-60.8)	1,000	0.18
Omega 3 (g)	9.2 (6.5-15.8)	9.1 (6.56-11.9)	0,977	0.01
Omega 6 (g)	33.3(27.2-51.1)	37.7 (30.6-48.8)	0,402	0.17
Omega 6 / Omega 3	3.8 (3.1-4.7)	4.2 (3.1-4.7)	0,319	0.21
Sodium (mg)	4965.5 (4676.7-5164.3)	4841.9 (4624.9-5203.1)	0,751	0.06
Potassium (mg)	4714.3 (4327.8-5382.6)	4830.1 (4391.4-5133.6)	0,644	0.10
Calcium (mg)	1454.2 (1272.1-1532.4)	1441.9 (1270.9-1532.8)	0,817	0.05
Magnesium (mg)	465.5 (426.2-520.1)	471.4 (442.5-519.9)	0,470	0.15

*ES: Effect size

Discussion

Cardiovascular diseases remain the leading cause of mortality, and in recent years, the use of artificial intelligence in chronic disease management—particularly through diet models like the Mediterranean and DASH diets—has gained attention; this study explores dietary plans generated by ChatGPT for various cardiovascular risk profiles and their potential impacts.

When the dietary patterns created by ChatGPT in different risk conditions of blood pressure and dyslipidaemia were analysed, it was determined that compliance with the Mediterranean diet and DASH diet remained low (Fig. 1). In a comprehensive meta-analysis, it was found that the DASH diet significantly reduced systolic and diastolic blood pressure compared to the control diet (17). In a study examining the relationship between adherence to the DASH diet and serum lipid parameters, adherence to the DASH diet was associated with a lower relative risk of LDL cholesterol and total cholesterol (OR: 0.43; 95% CI: 0.19-0.94; OR: 0.44; 95% CI: 0.20-0.96, respectively) (18). In a study examining the relationship between adherence to the Mediterranean diet and dyslipidaemia in individuals with familial hypercholesterolemia, there was a negative correlation between adherence to the Mediterranean diet and LDL cholesterol and inflammation parameters. The Mediterranean diet is also effective on hypertension (19). Considering the studies, Mediterranean and DASH diets are effective in the management of cardiovascular diseases. In this context, considering that the compliance of AI-supported diet models with the Mediterranean and DASH diet remains low, users should be aware of this issue. There are several plausible reasons for the observed deviations. First, ChatGPT might lack the inherent ability to enforce formal dietary guidelines unless explicitly prompted. It generates meal plans based on general knowledge and common patterns in its training data The AI may exhibit a preference for dietary patterns that diverge from DASH or Mediterranean guidelines—such as low-carbohydrate or high-protein meals—due to its exposure to a wide range of internet sources, which often over-represent popular dietary trends and recipes (20). Second, an important factor influencing the quality and accuracy of ChatGPT's dietary output is prompt engineering – that is, the specificity and clarity of the user's query. In our study, the prompts simply requested a nutrition plan for a given patient profile and condition (hypertension or dyslipidemia) without additional instructions. This likely led ChatGPT to produce a broadly healthy diet, but not one tailored to score highly on DASH or Mediterranean adherence scales. When more specific commands are given—such as specifying a calorie limit or emphasizing certain food groups—ChatGPT is able to provide more tailored and appropriate suggestions. When a target daily calorie level was included in the prompt, ChatGPT's calorie and nutrient accuracy improved markedly (11).

When the contents of the diet models created by ChatGPT were examined, carbohydrate was low, fat and saturated fatty acid ratio was high, and protein and fiber were sufficient. In a large-participant study involving Chinese individuals, low carbohydrate consumption has the risk of increasing blood pressure in individuals with hypertension, and that the ideal carbohydrate consumption in terms of blood pressure should be between 50%-55% (21). In a meta-analysis examining the relationship between low-carbohydrate diets and serum lipid parameters; low carbohydrate consumption may have a positive effect on high-density lipoprotein (HDL) and triglycerides, but a negative effect on LDL (22). Our study, AI-generated menus featured generous amounts of olive oil, nuts, and avocado (healthy fat sources), as well as animal proteins like eggs, dairy, red meat, chicken, fish. These choices increased total fat content (and in the case of eggs and dairy products, saturated fat and dietary cholesterol) while carbohydrate-rich foods remained limited. Giving more specific prompts (e.g. 50%-55% carbohydrate, low fat, low sodium) can improve results (10). Considering these effects; preparation of a diet plan with low carbohydrate content by AI may lead to potential negative effects. Given these factors, a potential direction for future research could involve tailoring AI prompts to specify target (e.g. macronutrient distributions, low sodium for hypertension) in order to evaluate whether AI-generated menus can more effectively align with recommended dietary guidelines.

Saturated fatty acid consumption is also very important in the management of cardiovascular diseases. Replacing carbohydrate with 1% energy from SFA consumed in the diet reduces LDL by 1.3 mg/dL, replacing it with monounsaturated fatty acids (MUFA) by 1.6 and 2.1 mg/dL, and replacing it with PUFA by 2.1 mg/dL (23). Saturated fatty acid consumption may also have a negative effect on blood pressure. In a case-control study, the risk of hypertension increased in men and women with high saturated fatty acid consumption (24). The World Health Organisation saturated fatty acid consumption recommendation is <10% of energy (25). For cardiovascular health, less than 7% of energy should come from saturated fatty acids (23). In this context, AI's preparation of a diet plan with high SFA content may lead to potential negative effects.

In addition to dietary contents, ChatGPT also provided various recommendations (Table 2). In this context, if necessary, weight loss, increased physical activity, restriction of salt consumption, stress management and the use of plant sterols for dyslipidaemia were recommended. AI's recommendations for weight loss, increasing physical activity, reducing salt consumption, stress management, consumption of plant sterols and omega-3, and reducing trans fatty acid consumption can be considered positive. However, smoking and alcohol consumption are also important for cardiovascular health. In a large cohort study, smoking and alcohol consumption significantly increased the risk of hypertension (26). In another study, smoking and alcohol consumption were associated with dyslipidaemia (27). In this context, the fact that AI does not make recommendations regarding smoking and alcohol consumption is considered negative. But this situation may be explained. Our prompts specifically asked for a "nutrition plan," which likely constrained the AI to think about foods and diet composition only. It may not have "interpreted" the query as a request for broader lifestyle counseling. Supporting this idea, one study demonstrates that ChatGPT can provide smoking cessation advice with specific prompting (28), while another publication suggests that tailored prompts improve outcomes (29). This highlights a limitation of the AI: it will usually answer within the scope defined by the user's question (30). However, since users can also aşk questions in this manner, the situation may be perceived negatively.

Although our study did not directly evaluate human-crafted diets, we have drawn on guiedes to contrast AI vs. human dietary planning. Registered dietitians are trained to follow evidence-based guidelines, so a dietitian designing a plan for a hypertensive or dyslipidemic patient would intentionally incorporate DASH or Mediterranean diet principles. A qualitative evaluation conducted in 2024 found that while AI-generated dietary plans demonstrated comparable accuracy to human-designed plans in terms of caloric content, they were less consistently aligned with established dietary frameworks such as the DASH and Mediterranean diets (8). Human dietitians, trained in evidence-based practice, typically achieve higher adherence scores, as evidenced by a 2025 study on diet quality across AI and human plans. For instance, human plans are more likely to cap saturated fat at 7% and sodium at 2300 mg/day, contrasting with ChatGPT's 13% and 4965 mg/day medians (31).

Despite the important findings of this study, there are some limitations. Firstly, there may be differences in the sodium value since the amount of added salt may vary when analysing the diets. Secondly, egg or cheese alternatives were written in the diets given, we calculated it as egg. This may lead to differences in cholesterol calculation. However, even if the other food is calculated, cholesterol will remain above the consumption recommendation. Moreover, this study did not consider cultural dietary preferences, which influence adherence. Future studies should explore culturally and specific tailored prompts and compare AI with human plans.

Conclusion

This study is the first to evaluate the dietary models and recommendations of AI, which is developing day by day, in hypertension and dyslipidaemia in terms of compliance/health suitability to DASH and Mediterranean diet. The compliance of AI-supported dietary models with DASH and Mediterranean diet was low, but the recommendations were generally appropriate (except smoking and alcohol). As technology improves, further research into the effectiveness of AI for nutritional advice in the management of chronic diseases is needed.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Conflict of interest

The authors claim that there were no potential conficts of interest in the study due to business or financial relationships.

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