Journal of Multidisciplinary Healthcare

Dovepress
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ORIGINAL RESEARCH

Association Between Dietary Patterns and All-Cause Mortality in Individuals with Hypertension and Osteoporosis: A Retrospective Cohort Study

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Objective: To explore the association of dietary patterns with all-cause mortality in individuals with hypertension and osteoporosis.

Methods: Data on individuals aged ≥20 years who completed bone mineral density tests were retrieved from the National Health and Nutrition Examination Survey database. Three dietary patterns were Mediterranean Diet Score (MeDS), Alternative Health Eating Index (AHEI) and Dietary Approaches to Stop Hypertension (DASH). The relationships between osteoporosis (OS), hypertension (HTN) and all-cause mortality were assessed by multivariate and univariate Cox proportional hazard models, with hazard ratios (HRs) and confidence intervals (CIs). Interaction of OS and HTN on overall mortality was evaluated by the attributable proportion (AP), relative excess risk due to interaction (RERI), and synergy index (S). Associations of three dietary patterns with all-cause mortality were explored in different groups, including adults with HTN or OS only, and adults with or without OS and HTN. Subgroups of gender and menopausal state were further evaluated these associations.

Results: Of the total 16,358 participants, 1383 (5.84%) died during the follow-up duration. Participants who had HTN (HR=1.272, 95% CI: 1.083–1.494) or OS (HR=1.674, 95% CI: 1.262–2.221) had a higher risk of overall mortality. There was an interaction between HTN and OS on overall mortality (RERI=0.677, 95% CI: 0.070–1.285; AP=0.293, 95% CI: 0.094–0.492; SI=2.070, 95% CI: 1.124–3.813). The AHEI-2010, MeDS, and DASH were related to overall mortality in individuals with OS and HTN. The MeDS and DASH were concerned with all-cause mortality in HTN patients without OS. The MeDS and AHEI-2010 were linked to overall mortality in adults without OS and HTN.

Conclusion: The impacts of different dietary patterns were differences in multi-feature population. It was suggested that reasonable dietary management is beneficial to the prognosis of different populations.

Keywords: hypertension, osteoporosis, all-cause mortality, Mediterranean diet score, alternative health eating index (AHEI-2010), dietary approaches to stop hypertension

Introduction

Osteoporosis (OS), characterized by the deterioration of skeletal microarchitectue and loss of bone mass, can cause fracture.[1] Nearly 53.6 million adults over the age of 50 had OS in the United States.[2] Previous studies have found that non-gonadal hormone receptors in the osteoblast lineage cells, such as angiotensin II and adiponectin, directly modulate bone turnover and are implied in the etiology of metabolic syndrome, especially hypertension (HTN).[3,4] Martinez reported that mortality due to non-communicable diseases increased from 57% of all-cause mortality in 1990 to 72.3% in 2016.[5] It is necessary to carry out health management to improve the prognosis of patients with chronic diseases.

Received: 22 January 2025
Accepted: 8 June 2025
Published: 30 June 2025

The role of other dietary factors in the onset of chronic diseases has been well established. Dietary indices are used to describe the total quality of the diet from current nutritional knowledge and/or dietary guidelines for disease control.[6,7] The Mediterranean Diet Score (MeDS), Dietary Approaches to Stop Hypertension (DASH), and Alternative Health Eating Index (AHEI) are indices commonly used, as greater adherence is linked to a lower risk for chronic disease and death.[8] Several studies have shown that specific dietary patterns such as Mediterranean Diet Score (MeDS), Alternative Health Eating Index (AHEI-2010) and Dietary Approaches to Stop Hypertension (DASH) can significantly affect health outcomes such as all-cause mortality, Osteoporosis (OS) and Hypertension (HTN).[9–11]In OS patients with HTN, which dietary pattern is more favorable for prognosis is uncertain.

Hypertension and osteoporosis are two common age-related diseases. In recent years, more and more evidence has shown that there is a certain biological association between these two diseases. Studies have shown that hypertension not only affects bone mineral density through the increase in sodium on calcium excretion but also affects bone metabolism through the increase in reactive oxygen species in blood vessels, cytokines, renin-angiotensin-aldosterone system and so on.[12,13] High sodium diet, oxidative stress and inflammation are the main pathways by which hypertension affects the risk of osteoporosis. The increase in reactive oxygen species in blood vessels will also have a negative impact on bone metabolism, further exacerbating osteoporosis.[14]

Herein, we explored the interaction of OS and hypertension on the all-mortality, and further assessed the association between different dietary patterns (MeDS, AHEI-2010, and DASH) and all-cause mortality among multi-feature population, including adults with HTN or OS only, and adults with or without OS and HTN. Moreover, the associations were also evaluated based on the gender and menopausal state.

Materials and Methods

Study Design and Population

Data from the cohort study were retrieved retrospectively from the National Health and Nutrition Examination Survey (NHANES) database, an ongoing nationwide survey of the health and nutritional status of the non-institutionalized people in the United States.

A total of 41,209 subjects were collected. Of which, 18,308 subjects aged <20 years, 6,480 without bone mineral density (BMD) data, 23 without HTN information, and 40 without mortality information were excluded. Finally, 16,358 individuals were enrolled. Figure 1 shows the selection process.

Definition and Follow-up

OS was defined according to the World Health Organization (WHO) diagnostic criteria of BMD values greater than 2.5 standard deviation (SD) below the mean of young adult reference group. Mean femoral BMD of non-Hispanic white female aged 20 to 29 years from NHANES III was selected as the reference.[15] OS was assessed separately in femur neck, trochanter, total femur, and intertrochanter. The overall OS was considered as OS in all of the femoral regions of interest.

HTN was defined in the seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guideline.[16] HTN was defined as systolic blood pressure of 140 mmHg (1 mmHg = 0.133 kpa) or diastolic blood pressure of 90 mmHg (1 mmHg = 0.133 kpa) or taking antihypertensive medication. Definitions of DASH, AHEI-2010, and MeDS are provided in Supplementary materials.

The outcome in this study was overall mortality. The average follow-up time was 84 months.

Interaction Measurements

The relative excess risk (RERI), synergy index (S) and attributable proportion (AP) were used to assess the additive and multiplicative interactions of OS and HTN on total mortality.[17] RERI is equal to RR11-RR10-RR01+1, where RR is the relative risk, 1 represents the presence of an exposure factor, and 0 is the absence.[18] AP equals the ratio of RERI to RR11 and refers to the proportion of disease in the exposure group that is attributable to the exposure. When the CI for RERI or AP did not contain 0, there was an additive effect. S denotes the multiplicative interaction, which is equal to RR11/(RR10×RR01).[9] The multiplicative interaction is significant when the CI of S does not contain 1.

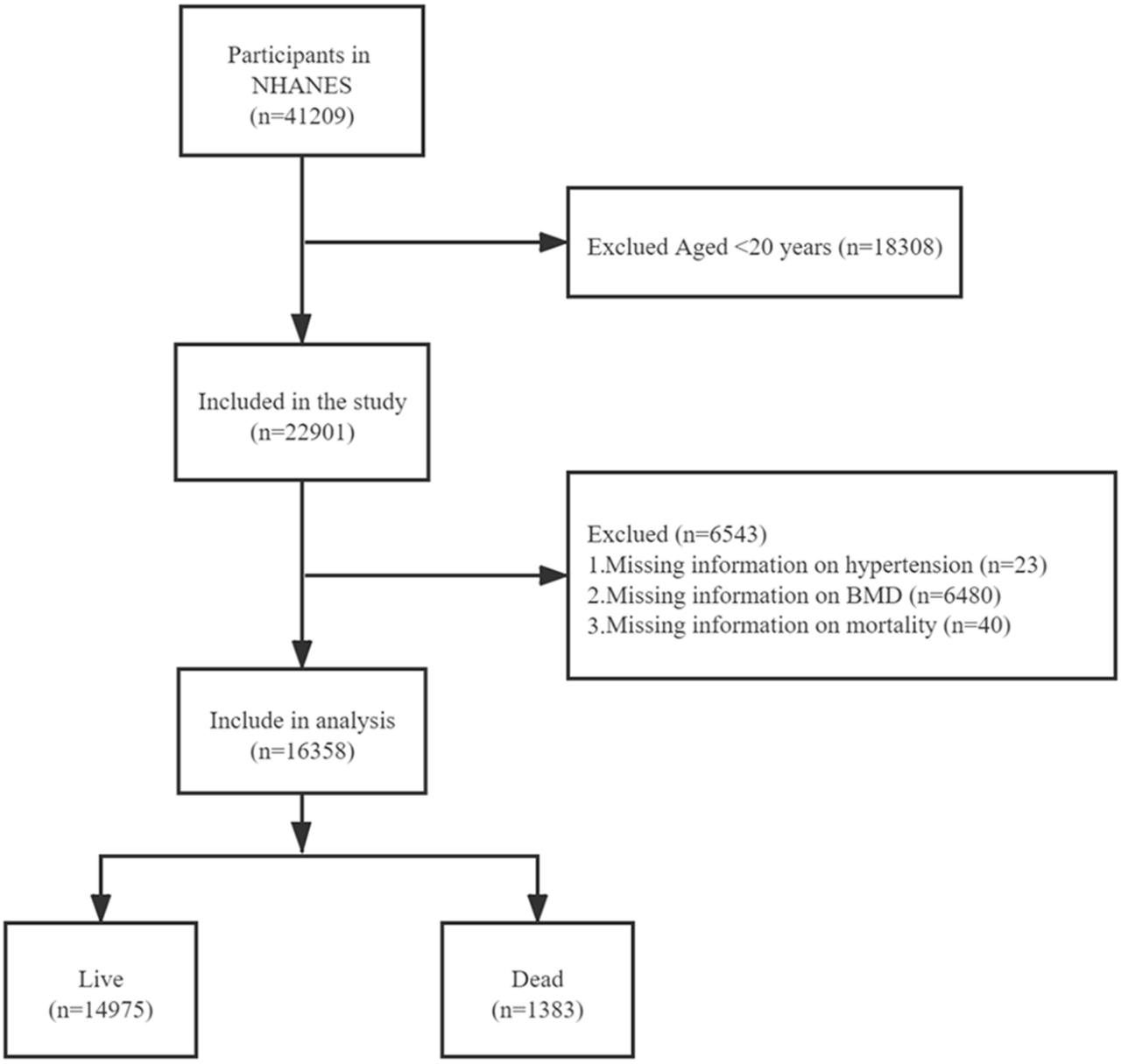

Figure 1 Flow chart of participant screening.

Statistical Analysis

Data missing interpolation were performed using a 5-imputation method. The normality of measurement data was evaluated via Shapiro–Wilk test. Of which, the data with normal distribution were assessed using independent samples *t*-test and described as mean (standard error, SE); the data without normal distribution were evaluated by Mann–Whitney *U*-test and described as median and quartiles [M(Q1, Q3)]. Enumeration data were assessed by Chi-square or Fisher's exact probability tests and expressed as the number of cases and composition ratio N(%). The sociodemographic information was analyzed to screen the potential covariates using univariate COX regression analysis. Impacts of OS and HTN on the mortality were assessed using multivariate and univariate Cox proportional hazard models, with hazard ratios (HRs) and confidence intervals (CIs). Model I was a rough model without adjustment for any covariates. Model II had adjustment for age and sex. Model III had adjustment for age BMI, gender, marital status, ethnicity, alcohol consumption, education level, smoking, annual income, health insurance, diabetes history, and physical activity. Interaction of OS and HTN on the all-cause mortality was evaluated by the RERI, AP, and S. Then, the associations

between DASH, MeDS, AHEI-2010 scores and all-cause mortality were investigated using COX regression analysis among individuals without OS and HTN, individuals with HTN only, individuals with OS only, and OS patients with HTN. The HR values were calculated after standardized processing. The subgroup analyses for the effects of various dietary scores on overall mortality were conducted for men, women and postmenopausal women. Two-tailed test was used for all statistical analyses. The results of all analyses were weighted except sensitivity test. SAS 9.4 (SAS Institute, Cary, NY, USA), R 4.20 (R Foundation, Vienna, Austria) and GraphPad 6.0 were performed for analyzing and drawing. P <0.05 was considered as statistical differences.

Results

Characteristics of 16,358 Participants

Data on 22,901 participants aged above 20 years were extracted. Participants with no information about HTN, survival status, and BMD were eliminated. Then, 16,358 participants were finally recruited into this cohort study, with an average of 48.67 (0.27) years and an average BMI of 28.04 (0.08) kg/m^2. 8,370 (51.17%) were men, 7,788 (47.31%) were smoking, 5,857 had HTN, and 699 suffered from OS. A total of 1,383 adults died during follow-up, with a median follow-up time of 84.03 (64.07, 105.53) months. The characteristics of these participants were shown in Supplementary Table 1. The flow chart of participant screening was displayed in Figure 1.

Associations Between HTN, OS and All-Cause Mortality

The covariates screening of overall mortality is presented in Supplementary Table 2. When adjusted for age, gender, BMI, ethnicities, marital status, smoking, alcohol consumption, annual income, medical insurance, history of diabetes and physical activity, participants who had HTN had an increased mortality risk from all causes (HR=1.272, 95% CI: 1.083–1.494, P=0.004). OS was linked to higher mortality risk from all causes (HR=1.674, 95% CI: 1.262–2.221, P<0.001). The associations between HTN, OS and overall mortality are shown in Table 1.

The Interaction Between HTN and OS on All-Cause Mortality

Table 2 presents the interaction between HTN and OS on all-cause mortality. Patients with HTN without OS, with OS without HTN, with OS and HTN had 0.224, 0.409, 1.310 folds higher mortality risk from all causes than those without HTN and OS, respectively. The synergistic interaction between HTN and OS on all-cause mortality [RERI: 0.677 (95% CI: 0.070–1.285), AP: 0.293 (95% CI: 0.094–0.492), SI: 2.070 (95% CI: 1.124–3.813)]. Figure 2 shows the interaction of HTN and OS with all-cause mortality.

Associations Between DASH, MeDS, AHEI-2010 Scores and All-Cause Mortality Among Multi-Feature Populations

After adjusting the covariates, higher DASH scores were associated with lower mortality risk from all causes in hypertensive individuals with (HR=0.833, 95% CI: 0.796–0.981) or without (HR=0.670, 95% CI: 0.525–0.854) OS.

Table 1 Associations Between Hypertension, Osteoporosis and All-Cause Mortality

Variables	Model I		Model II		Model III	
	HR (95% CI)	P	HR (95% CI)	P	HR (95% CI)	P
Hypertension						
Yes	3.144 (2.698–3.664)	<0.001	1.241 (1.072–1.437)	0.005	1.272 (1.083–1.494)	0.004
No	Ref		Ref		Ref	
Osteoporosis						
Yes	1.000 (0.260–3.840)	1.000	2.102 (1.548–2.854)	<0.001	1.674 (1.262–2.221)	<0.001
No	Ref		Ref		Ref	

Notes: Model I: crude model; Model II: adjusting age and gender;Model III: adjusting age, gender, BMI, ethnicities, marital status, education level, alcohol consumption, smoking, annual income, health insurance, physical activity and diabetes history.
Abbreviations: HR, hazard ratio; CI, confidence interval; Ref, reference.

Table 2 The Interaction Between Hypertension and Osteoporosis on All-Cause Mortality

Groups	Model 1		Model 2		Model 3	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
I	Ref		Ref		Ref	
II	3.019 (2.578–3.535)	<0.001	1.229 (1.057–1.429)	0.008	1.224 (1.044–1.436)	0.014
III	6.994 (5.186–9.433)	<0.001	1.836 (1.362–2.475)	<0.001	1.409 (1.026–1.934)	0.034
IV	15.400 (11.105–21.358)	<0.001	2.932 (2.007–4.283)	<0.001	2.310 (1.683–3.171)	<0.001
RERI (95% CI)	6.387 (1.989–10.785)		0.867 (−0.025–1.758)		0.677 (0.070–1.285)	
AP (95% CI)	0.415 (0.239–0.590)		0.296 (0.078–0.514)		0.293 (0.094–0.492)	
SI (95% CI)	1.797 (1.299–2.487)		1.813 (1.094–3.007)		2.070 (1.124–3.813)	

Notes: Group I: participants without osteoporosis and hypertension; Group II: hypertensive patients without osteoporosis; Group III: osteoporotic patients without hypertension; Group IV: patients with osteoporosis and hypertension. **Abbreviations**: HR, hazard ratio; CI, confidence interval; Ref, reference; RERI, interaction; AP, attributable proportion; SI, synergy index.

Higher levels of adherence to MeDS were linked to a decreased likelihood of overall mortality in individuals without OS and HTN (HR=0.868, 95% CI: 0.773–0.975), hypertensive patients without OS (HR=0.866, 95% CI: 0.781–0.959), and individuals with OS and HTN (HR=0.717, 95% CI: 0.541–0.950). Elevated AHEI-2010 scores were linked to a decreased overall mortality risk in individuals without OS and HTN (HR=0.850, 95% CI: 0.754–0.959), and patients with OS and HTN (HR=0.641, 95% CI: 0.507–0.810). Table 3 and Figure 3 show the relationships of DASH, MeDS, and AHEI-2010 scores with all-cause mortality.

The Associations in Subgroups of Males, Females or Post-Menopause Women

The subgroups of males, females or post-menopause women were used to further assess the associations as shown in Table 4. For males, the relationships between DASH (HR=0.358, 95% CI: 0.233–0.550), MeDS (HR=0.462, 95% CI: 0.266–0.803), AHEI-2010 (HR=0.417, 95% CI: 0.277–0.629) scores and all-cause mortality were statistical differences in the Group IV. Similar results were found in the Group I, except that the relation between DASH score and overall mortality was marginal significance (HR=0.865, 95% CI: 0.744–1.006). For females, the DASH score was related to all-cause mortality in the Group II (marginal significance, HR=0.866, 95% CI: 0.748–1.002), III (HR=0.698, 95% CI: 0.512–0.950) and IV (HR=0.714, 95% CI: 0.544–0.936). The MeDS score was associated with overall mortality in the Group IV (HR=0.718, 95% CI: 0.516–0.999). The AHEI-2010 score was in connection with overall mortality in Groups II (HR=0.853, 95% CI: 0.735–0.991) and IV (HR=0.654, 95% CI: 0.504–0.849).

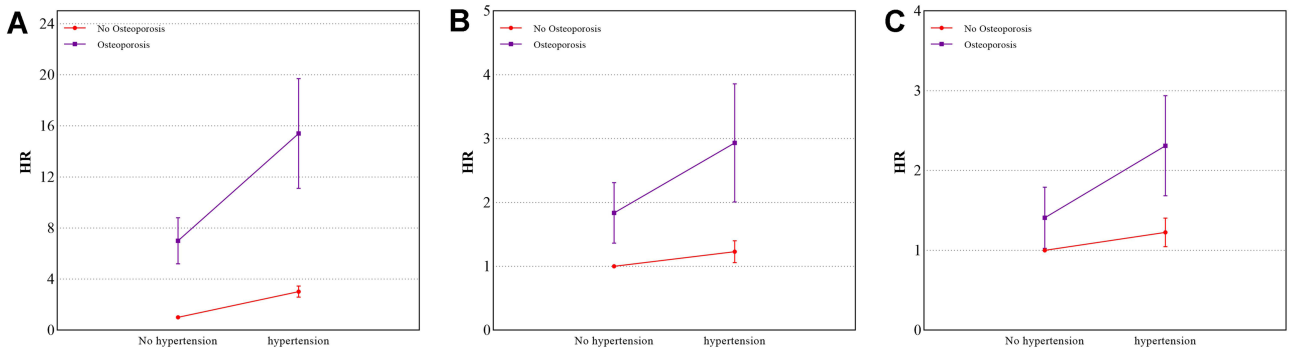

Figure 2 The interaction of HTN and OS with all-cause mortality. (**A**) model 1; (**B**) model 2; (**C**) model 3.
Abbreviations: HTN, hypertension; OS, osteoporosis.

https://doi.org/10.2147/JMDH.S518980

Table 3 The Associations Between DASH, MeDS, AHEI-2010 Scores and All-Cause Mortality Among Multi-Feature Populations

Scores	Group I		Group II		Group III		Group IV	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
DASH								
Crude model	0.982 (0.873–1.105)	0.761	1.004 (0.895–1.125)	0.950	0.966 (0.775–1.205)	0.755	0.706 (0.571–0.872)	0.002
Adjusted model	0.909 (0.783–1.054)	0.203	0.883 (0.796–0.981)	0.021	0.761 (0.574–1.008)	0.057	0.670 (0.525–0.854)	0.002
MeDS								
Crude model	0.887 (0.807–0.975)	0.014	0.821 (0.720–0.937)	0.004	0.791 (0.603–1.038)	0.090	0.736 (0.588–0.920)	0.008
Adjusted model	0.868 (0.773–0.975)	0.018	0.866 (0.781–0.959)	0.007	0.821 (0.590–1.142)	0.236	0.717 (0.541–0.950)	0.021
AHEI-2010								
Crude model	0.924 (0.834–1.023)	0.124	0.953 (0.852–1.066)	0.397	1.021 (0.789–1.320)	0.874	0.710 (0.560–0.901)	0.006
Adjusted model	0.850 (0.754–0.959)	0.009	0.903 (0.810–1.007)	0.065	0.991 (0.763–1.288)	0.947	0.641 (0.507–0.810)	<0.001

Notes: Group I: participants without osteoporosis and hypertension; Group II: hypertensive patients without osteoporosis; Group III: osteoporotic patients without hypertension; Group IV: patients with osteoporosis and hypertension.
Abbreviations: DASH, Dietary Approaches to Stop Hypertension; MeDS, Mediterranean Diet Score; AHEI, Alternative Health Eating Index; HR, hazard ratio; CI: confidence interval.

In post-menopause women, the connections between high DASH scores and decreased odds of overall mortality were established in Groups III (HR=0.684, 95% CI: 0.494–0.946) and IV (HR=0.741, 95% CI: 0.555–0.989). The relationships of AHEI-2010 with overall mortality were discovered in Groups II (HR=0.824, 95% CI: 0.714–0.951) and IV (HR=0.673, 95% CI: 0.511–0.885).

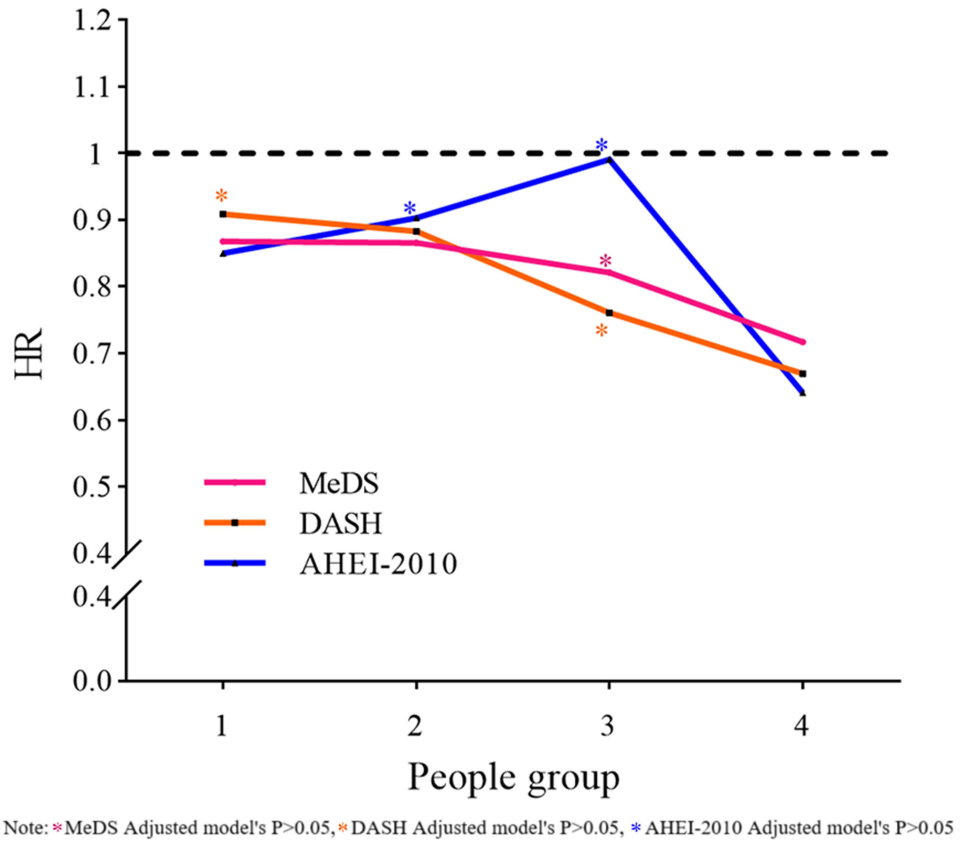

Figure 3 The relationships of DASH, MeDS, AHEI-2010 scores with all-cause mortality.
Abbreviations: DASH, Dietary Approaches to Stop Hypertension; MeDS, Mediterranean Diet Score; AHEI, Alternative Health Eating Index.

Table 4 Associations Between DASH, MeDS, AHEI-2010 Scores and All-Cause Mortality

Scores	Group I		Group II		Group III		Group IV	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
Male								
DASH	0.865 (0.744–1.006)	0.059	0.892 (0.761–1.045)	0.155	1.172 (0.604–2.273)	0.618	0.358 (0.233–0.550)	<0.001
MeDS	0.806 (0.686–0.947)	0.010	0.874 (0.756–1.011)	0.069	0.733 (0.340–1.580)	0.403	0.462 (0.266–0.803)	0.012
AHEI-2010	0.863 (0.746–0.998)	0.047	0.937 (0.787–1.117)	0.463	2.423 (0.918–6.393)	0.071	0.417 (0.277–0.629)	<0.001
Female								
DASH	1.050 (0.796–1.385)	0.726	0.866 (0.748–1.002)	0.054	0.698 (0.512–0.950)	0.023	0.714 (0.544–0.936)	0.016
MeDS	1.013 (0.845–1.214)	0.888	0.847 (0.704–1.020)	0.078	0.822 (0.558–1.211)	0.314	0.718 (0.516–0.999)	0.049
AHEI-2010	0.814 (0.643–1.032)	0.088	0.853 (0.735–0.991)	0.038	0.840 (0.634–1.113)	0.219	0.654 (0.504–0.849)	0.002
Post-menopause								
DASH	1.027 (0.772–1.367)	0.851	0.907 (0.763–1.078)	0.263	0.684 (0.494–0.946)	0.023	0.741 (0.555–0.989)	0.042
MeDS	0.982 (0.775–1.245)	0.881	0.863 (0.698–1.068)	0.172	0.805 (0.537–1.207)	0.286	0.746 (0.530–1.050)	0.092
AHEI-2010	0.815 (0.621–1.069)	0.136	0.824 (0.714–0.951)	0.009	0.835 (0.623–1.118)	0.219	0.673 (0.511–0.885)	0.006

Notes: Group I: participants without osteoporosis and hypertension; Group II: hypertensive patients without osteoporosis; Group III: osteoporotic patients without hypertension; Group IV: patients with osteoporosis and hypertension.

Abbreviations: DASH, Dietary Approaches to Stop Hypertension; MeDS, Mediterranean Diet Score; AHEI, Alternative Health Eating Index; HR, hazard ratio; CI, confidence interval.

Discussion

In this cohort study with a large population (16,358 participants), we explored the interaction of OS and hypertension on the all-mortality, and further assessed the association between different dietary patterns (MeDS, AHEI-2010, and DASH) and all-cause mortality among multi-feature population, including adults with HTN or OS only, and adults with or without OS and HTN. Participants who had HTN or OS had higher overall mortality risk. We found that HTN and OS interacted to affect overall mortality. The AHEI-2010, MeDS, and DASH were linked to overall mortality in individuals with HTN complicated with OS.

Higher adherence to MeDS was linked to reduced overall mortality risk in the whole cohort who had OS and HTN. This finding was consistent across the groups of males and females, different from post-menopause women. Previous studies have shown that higher MeDS adherence is linked to a better survival.[19,20] Whether the survival edge is maintained in people with different characteristics is not yet clear. Regarding the components of MeDS, increased intakes of nuts, fruits, whole grains, or vegetables were concerned with a decline in overall mortality risk.

Studies have shown that lipid metabolism may be involved in the development of osteoporosis,[21,22] this may be a potential mechanism for the interaction between hypertension and osteoporosis. In addition, studies have shown that the activation of the local renin–angiotensin system in bone tissue can lead to increased bone resorption, leading to osteoporosis, which is also a possible way for osteoporosis and hypertension to interact.[23,24] Previous studies have shown that hormone levels, histone modifications, dairy intake, diabetes, calcium and phosphorus metabolism in the body are closely related to hypertension and osteoporosis.[25–31] There are also some studies that provide different results: Amirkhanlou et al found that osteoporosis has a lower incidence in patients with hypertension, and Laure Rouch et al and Michael et al have similar results.[32–34]

The DASH diet has played a role in blood pressure reduction, which was originally introduced for the HTN treatment in the 1990s.[35,36] Strict DASH diet adherence may contribute to survival improval.[37] High DASH scores were linked to reduced odds of overall mortality in hypertensive adults.[38] However, no relationship was found between the DASH score and the risk of death from all causes in the general public.[39] DASH adherence was low among the general public,[39] even among hypertensive patients.[40] Similar results were discovered in our study. It was indicated that high DASH maintenance might be beneficial to the health management of chronic diseases.[37] For the DASH components, elevated fiber, magnesium, or potassium intakes were linked to a reduction overall mortality risk.

The AHEI was based on large epidemiological studies for the prevention of noncommunicable diseases.[41] Though the HEI and AHEI diet scores had slightly different aims, they both emphasize high consumption of fruits, vegetables, monounsaturated fat, legumes, whole grains, with recommendations to reduce consumption of saturated fatty acids,

added sugars, refined grains, and sodium associated with increased HTN risk.[42] A diet rich in fiber, low energy density, and low glycemic load protects against HTN.[43] The beneficial effects of vegetables/fruits on HTN could be attributed to phytochemicals,[44] vitamins,[45] Mg, and K[46] and antioxidants,[47] which are independently linked to blood pressure reduction. Eating nuts and soya, and drinking alcohol in moderation, appeared to be the most independently powerful contributors to decrease mortality.[48] What makes the MED diet unique and distinctive is the relatively high use of nuts, olive oil and moderate use of red wine at mealtimes.[49] High compliance with the MeDS diet has also been reported to reduce blood pressure.[50,51]

Dietary studies have shown that specific dietary patterns have a significant effect on reducing the risk of death, mainly by regulating inflammation, improving blood lipid and blood glucose management, controlling blood pressure and bone health. Specific dietary patterns, such as the Mediterranean diet and the DASH diet, have been extensively studied and shown to reduce all-cause mortality and the risk of death from specific diseases (such as cardiovascular disease). The Mediterranean diet and DASH diet, which are rich in antioxidants and anti-inflammatory foods, help to reduce the inflammatory response in the body.[52–55] By inhibiting oxidative stress and inflammatory responses, these dietary patterns help reduce the risk of chronic diseases such as diabetes and cardiovascular disease. The DASH diet is specifically designed to reduce high blood pressure by reducing sodium intake and increasing potassium, magnesium and calcium intake.[56–58] Mediterranean diet rich in monounsaturated fatty acids helps reduce low-density lipoprotein (LDL) levels and increase high-density lipoprotein (HDL) levels.[59–62] In addition, these dietary patterns are also rich in dietary fiber, which helps to control blood glucose levels, reduce insulin resistance, and reduce the risk of metabolic syndrome and type 2 diabetes. The Mediterranean diet and the DASH diet are rich in nutrients needed for bone health to help maintain bone mineral density and prevent osteoporosis.[63–69]

Although adjustment was made for socio-economic variables and chronic diseases, disease condition and treatment during follow-up were hard to adjust for. Dietary information was collected by a continuous 24-hour dietary recall using questionnaires. Long-term adherence to the dietary patterns was not addressed. The single components of dietary scores were not further assessed in this study, which may be beneficial for making dietary decisions. Our findings may give some hints for dietary recommendations for multi-feature individuals. Considering that diet data mainly relying on self-reporting can introduce recall bias, and the impact of treatment on HTN and OS during follow-up may confuse the results; future well-designed studies with long-term observation are essential.

Conclusion

This study explored the associations of different dietary patterns with all-cause mortality among multi-feature population. The MeDS, AHEI-2010 and DASH were all associated with overall mortality in individuals with OS and HTN. The MeDS and DASH were concerned with all-cause mortality in HTN patients without OS. The MeDS and AHEI-2010 were linked to overall mortality for adults without OS and HTN. The impacts of different dietary patterns were differences in multi-feature population. It was suggested that reasonable dietary management is beneficial to the prognosis of different populations.

Data Sharing Statement

The datasets used and/or analysed during the current study were publicly available from the NHANES database.

Ethics Approval and Consent to Participate

Not applicable, because NHANES belongs to public databases, the patients involved in the database have obtained ethical approval, users can download relevant data for free for research and publish relevant articles, and our study is based on open-source data, and the South Hospital of the Sixth People's Hospital Affiliated to Shanghai University of Medicine & Health Sciences (Shanghai Fengxian District Central Hospital) do not require research using publicly available data to be submitted for review to their ethics committee, so there are no ethical issues and other conflicts of interest.

Consent for Publication

Not applicable, because this paper did not reveal any personal information of patients.

Acknowledgments

Jianhua Guan, Liang Ding, Yifei Wang and Zhongsheng Zhu are co-first authors for this study.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This study was supported by the Key Project of the Diagnosis and Treatment Center of Shanghai Fengxian District (No. fxlczlzx-a-201704).

Disclosure

All authors declare that they have no conflicts of interest for this work.

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