

Effect of dietary selenium intake and hypertension on mild cognitive impairment in elderly

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Submitted to: JMIR Public Health and Surveillance
on: April 20, 2025

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Effect of dietary selenium intake and hypertension on mild cognitive impairment in elderly

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Abstract

Background: It is urgent to achieve precise prevention for the mild cognitive impairment (MCI) population.

Objective: This study aimed to explore effects of dietary selenium intake and hypertension on MCI.

Methods: A multicenter cross-sectional study was conducted in 2020, involving 1084 elderly people aged ≥55 years in Zhejiang Province, China. Data on demographics, cognitive assessment, depression scale, dietary intake and physical examinations were collected. Dietary selenium intake was calculated based on the converted Food Frequency Questionnaire (FFQ) Food Composition Tables developed and validated in this study and the data of the FFQ. Multivariate logistic regression models were used to assess the relationship between hypertension and mild cognitive impairment and the interactive effect of dietary selenium intake and hypertension on MCI.

Results: The prevalence of MCI among all participants was 24.6%. After adjusting for age, educational level, marriage, depression, BMI, central obesity, frequency of social activities, sleep disturbances, smoking, drink alcohol, diabetes, energy intake and salt in seasonings intake, the dietary selenium intake ≥ 100 μg/d was significantly associated with a reduced risk of MCI (OR = 0.27, 95% CI: 0.19~0.40), while hypertension was significantly associated with an increased risk of MCI (OR = 1.82, 95% CI: 1.3~2.54). Subgroup analyses showed that stronger association was found between hypertension and MCI among participants with a dietary selenium intake < 100 μg/d (OR = 2.42, 95% CI: 1.40~4.17). Interaction analysis indicated that hypertension and dietary selenium intake had a negative additive interaction on MCI (RERI: -1.389 (-2.574 ~ -0.205), AP: -3.165 (-5.739 ~ -0.590), and the protective effect of dietary selenium intake prevailed.

Conclusions: Dietary Selenium intake and hypertension may have a potential negative interactive effect on the MCI. Precise intervention strategies are needed. Clinical Trial: None

(JMIR Preprints 20/04/2025:76281)

DOI: <https://doi.org/10.2196/preprints.76281>

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Conclusions: Dietary Selenium intake and hypertension may have a potential negative interactive effect on the MCI. Precise intervention strategies are needed.

Keywords: Dietary selenium intake, Hypertension, Mild cognitive impairment, interactive effect

Introduction

The problem of global aging is intensifying at an astonishingly rapid pace, as well as in China [1,2]. Alzheimer's disease (AD), as a primary dementia entailed by aging, can impose substantial burdens on families, health systems, and society [3-5]. Globally, around 55 million people have AD, with 10 million in China [4,5]. To date, clinical trials designed to treat AD have yet to yield successful outcomes [6]. Therefore, primary prevention of AD is of crucial importance. Mild cognitive impairment (MCI) is an intermediate stage between the normal cognitive decline due to aging and dementia. Notably, within 12 months of diagnosis, 10% to 20% of individuals with MCI progress to overt dementia [7]. Exploring the influencing factors of MCI, identifying high-risk groups and exploring protective factors to achieve precise prevention are the keys to preventing AD.

Previous studies have reported that the population with hypertension might be at a higher risk of developing MCI, due to several intracranial and extracranial mechanisms [8,9]. The World Health Organization (WHO) estimates that as many as 1.28 billion adults (age 30-79 years) have hypertension across the world [10]. Earlier cognitive screening and management should be actively advocated for hypertensive patients. Nutrition assumes a crucial and essential role in the brain's senescence process, with certain nutrients having antioxidant properties potentially exerting a protective effect against the occurrence of MCI [11]. Selenium, a trace element essential for both human and animals, is a necessary component of proteins and enzymes involved in functions such as antioxidant defense, modulation of the inflammatory response and neuroprotective effects [12,13]. Population-based studies have indicated the protective effect of selenium on MCI. For example, results from one Chinese cohort suggested that the blood selenium beyond a certain level was significantly associated with a lower risk of developing MCI [14]. Meanwhile, previous studies also demonstrated that selenium supplementation could improve the cognitive test evaluations of patients with MCI [15]. A cross-sectional study also suggested that dietary selenium intake is negatively associated with the disease severity of MCI and AD [16]. Hypertension and selenium nutritional status, as two potential determinants of MCI, were also supported by research evidence indicating their mutual influence. Observational studies in China found that a negatively linear correlation might exist between dietary selenium intake and hypertension [17,18]. Whether dietary selenium intake can modulate the effect of hypertension on cognitive function represented a point worthy of exploration. However, to date, few studies focused on the interactive effect of dietary selenium intake and hypertension on MCI. This exploration aimed to focus on preventive strategies for the pre-dementia stage of AD. This multicenter cross-sectional study aimed to investigate the effects of dietary selenium intake and hypertension on MCI, along with their interactive effects, in order to provide a scientific basis for the formulation of dietary selenium intake in the Dietary Reference Intakes (DRIs).

Methods

Study Design

The data utilized in this study were derived from the follow-up assessments of the Community-based Cohort Study on Nervous System Diseases-AD cohort [19], which primarily examined potential risk factors associated with AD in adults aged ≥ 55 years. Detailed information was described previously. In short, questionnaires and comprehensive physical examinations were conducted in Zhejiang Province during September, 2020 [20]. The study protocol received ethical approval from the Medical Ethics Committee of the National Institute for Nutrition and Health, Chinese Center for Disease

Control and Prevention (Approval No. 2017020, dated November 6, 2017). A written informed consent was obtained from all participants in accordance with ethical guidelines before participation.

Study Population and Sampling Method

The study cohort was established through a multistage stratified random sampling methodology conducted in Zhejiang Province during the baseline survey [20]. The inclusion criteria for study participants were defined as: (1) age ≥ 55 years; (2) permanent residency status within the sampled community; and (3) absence of comorbid conditions potentially confounding the assessment outcomes, including congenital or acquired mental retardation, and uncorrectable visual or auditory impairments. Following stringent quality control measures and application of inclusion criteria, the final analytical sample comprised 1,084 participants, as detailed in Figure 1.

Data Collection

Data collection encompassed two primary modalities: (1) Questionnaire assessing sociodemographic characteristics (age, educational attainment, occupational status, and marital status), cognitive function, depressive symptoms, health-related information and dietary intake. Dietary intake was quantified using a validated Food Frequency Questionnaire (FFQ) encompassing 81 distinct food categories. (2) Standardized physical examinations performed by certified health professionals from local community health centers, including blood pressure, height, weight, and waist circumference. The requirements for blood pressure measurement: (1) the participants were asked to rest for 5 to 10 minutes in a quiet and comfortable environment, avoiding the consumption of coffee and strong tea before the measurement, refraining from strenuous exercise or emotional agitation. (2) The blood pressure should be measured three times in parallel, with an interval of 5 minutes between each measurement, and the participants should remain in a quiet resting state during the measurement process. In this study, strict quality control was implemented before and during the investigation [20].

Assessment of cognitive function

Considering the advantages of the Montreal Cognitive Assessment (MOCA) over the Mini-Mental State Examination (MMSE), only the MOCA scale was employed to evaluate the cognitive function of participants in this study [21]. The Beijing version of the MoCA scale, whose reliability and validity have been validated in the Chinese population, was adopted in this study [22-24]. The MoCA was administered through standardized face-to-face interviews conducted by certified investigators, adhering rigorously to established testing protocols and administration guidelines. The criteria for MCI were based on Chinese MoCA norms [22]: an illiterate individual was considered to have MCI if their total MoCA score was ≤ 13 ; for those with 1 - 6 years of education, the cutoff was ≤ 19 ; and for individuals with 7 or more years of education, the cutoff was ≤ 24 .

Assessment of dietary selenium, energy and salt in seasonings intake

Dietary nutrient intake were assessed according to FFQ, including 64 categories of foods and 7 types of nutrient supplements, and converted FFQ Food Composition Tables (FCTs). Since the FFQ in this study was the same as that in the China Nutrition and Health Project, the data from the China Health and Nutrition Survey (CHNS) in Zhejiang province (2018) [25] was used to establish the converted FFQ FCTs. Some studies have proven that the Weighted Food Composition Table method (WFCT) performed the best for nutrient assessment in FFQ [26]. Therefore, WFCT was applied to establish converted FFQ FCTs, based on representative 3-day 24-hour dietary recall (24HRs) data, and the Chinese Food Composition Table (2019) [27]. According to the converted FFQ FCTs and FFQ in this study, the daily energy and nutrient intakes per person were calculated, including selenium and energy. The intake of salt in seasonings per person per day was calculated by dividing the total

consumption of salt in seasonings in the monthly consumption of seasonings at the household level by the total number of people having meals cooked at home, and then dividing the result by 30 days.

Assessment of hypertension and other covariates

Participants with a previous diagnosis of hypertension, or those whose average systolic blood pressure measured three times during a physical examination was >140 mmHg, or whose average diastolic blood pressure measured three times was >90 mmHg were defined as the hypertension population. Depressive symptoms were assessed using the validated Geriatric Depression Scale (GDS), with a standardized cutoff score of ≥ 11 points employed for symptom identification [28]. Central obesity was defined in line with the criteria for adult weight in China [29]. The subjects were divided into the following three groups according to Body Mass Index (BMI): < 24.0 kg/m², $24 \sim 28$ kg/m², ≥ 28 kg/m² [30]. Sleep disturbances was evaluated using the Chinese-validated version of the Pittsburgh Sleep Quality Index (PSQI), for which a cut-off score of 5 was recommended as the screening criterion [31,32]. Smoke was defined as "Yes" if the participant had smoked and "No" if the participant had never smoked. Drink alcohol was defined as "Yes" if the participant had consumed alcohol in the past one year and "No" if the participant had not consumed alcohol in the past one year.

Statistical Analyses

Mean and standard deviations (mean $\pm$ SD) were employed to describe continuous variables with a normal distribution, while median and quartiles [(median (quartiles))] were utilized for variables presenting a skewed distribution. Frequencies and percentages (%) were reported for categorical variables. Categorical variables were compared using the chi-square test. A multiple logistic regression models were established to examine the effect of hypertension on MCI. Odds ratio (OR) and the corresponding 95% confidence interval (CI) of the potential influencing factors, including the previously described covariates, were calculated using age- and multivariate-adjusted models. Additional multivariate-adjusted models controlled for all previously mentioned covariates, plus dietary selenium intake in the hypertension analysis. To test for interactive effect, multivariate - adjusted multiple logistic regression models were constructed, which were used to perform a subgroup analysis of dietary selenium intake in relation to the impact of hypertension on MCI. To investigate the interactive effect of dietary selenium intake and hypertension on MCI, joint hypertension (No /Yes) and dietary selenium intake ($<100\mu\text{g/d}$ / $\geq 100\mu\text{g/d}$) variables were created[33]. Specifically, participants were classified into four groups according to both their hypertension status and dietary selenium intake. Age- and multivariate-adjusted models were generated with the joint variables using multiple logistic regression models. Biological interaction can be assessed by calculating the relative excess risk due to interaction (RERI) and the proportion of the combined effect that can be attributed to interaction (AP) [34]. If $\text{RERI} = 0$, then $\text{AP} = 0$, there is no interaction as departure from additivity; if $\text{RERI} < 0$, then $\text{AP} < 0$, there is negative interaction as departure from additivity. Forest plots and Restricted Cubic Spline (RCS) curve were plotted. The validity of food and nutrient intakes assessed by a food frequency questionnaire was analyzed using Spearman's correlation analysis. All statistical analyses were performed by using the program SAS version 9.1 and R language version 4.3.2. P less than 0.05 was considered statistically significant.

Results

Basic information

A total of 1,084 participants were included in the present study. The key characteristics of the participants are presented in Table 1. Overall, the prevalence of MCI was 24.6%. 585 participants and 54.0% participants had hypertension. The study population was evenly distributed across diverse

regions, age brackets, and genders.

Table 1. Main characteristics of study participants

Variables	Total, N	MCI, N(%)	Normal, N(%)	χ^2	P
Total	1084	267(24.6)	817(75.4)		
Region				3.13	0.077
Urban	554 (51.1)	149 (55.8)	405 (49.6)		
Rural	530 (48.9)	118 (44.2)	412 (50.4)		
Gender				0.01	0.932
Male	514 (47.4)	126 (47.2)	388 (47.5)		
Female	570 (52.6)	141 (52.8)	429 (52.5)		
Age , year				43.57	<0.001
55~65	372 (34.3)	63 (23.6)	309 (37.8)		
65~75	479 (44.2)	110 (41.2)	369 (45.2)		
75~	233 (21.5)	94 (35.2)	139 (17.0)		
Educational level				4.6	0.032
Junior school or below	927 (86.5)	236 (90.4)	691 (85.2)		
Senior high school or above	145 (13.5)	25 (9.6)	120 (14.8)		
Occupation				0.14	0.710
employed or re-employ after retirement or seeking employment	166(15.3)	39(14.6)	127(15.5)		
Retirement or unemployed	918(84.7)	228(85.4)	690(84.5)		
Marriage				1.11	0.293
married	919 (84.8)	221 (82.8)	698 (85.4)		
unmarried/ divorced/widowed	165 (15.2)	46 (17.2)	119 (14.6)		
BMI (kg/m²)				0.39	0.824
<24.0	582 (55.3)	147 (57.0)	435 (54.8)		
≥24~<28	371 (35.3)	88 (34.1)	283 (35.6)		
≥28	99 (9.4)	23 (8.9)	76 (9.6)		
Central obesity				1.04	0.308
No	582 (55.0)	150 (57.7)	432 (54.1)		
Yes	477 (45.0)	110 (42.3)	367 (45.9)		
Frequency of social activities				24.04	<0.001
Once per year or less	275 (25.4)	98 (36.7)	177 (21.7)		
More than once per year	809 (74.6)	169 (63.3)	640 (78.3)		
Depression				20.09	<0.001
No	1041 (96.0)	244 (91.4)	797 (97.6)		
Yes	43 (4.0)	23 (8.6)	20 (2.5)		
Sleep disturbances				6.10	0.014
No	585 (54.1)	126 (47.6)	459 (56.3)		
Yes	496 (45.9)	139 (52.5)	357 (43.8)		
Smoking				2.58	0.108
No	882 (81.5)	208 (78.2)	674 (82.6)		
Yes	200 (18.5)	58 (21.8)	142 (17.4)		
Drink alcohol				10.63	0.001
No	874 (80.6)	197 (73.8)	677 (82.9)		
Yes	210 (19.4)	70 (26.2)	140 (17.1)		
Diabetes				2.71	0.100
No	988 (91.6)	238 (89.1)	750 (92.4)		
Yes	91 (8.4)	29 (10.9)	62 (7.6)		
Hypertension				15.58	<0.001
No	499 (46.0)	95 (35.6)	404 (49.5)		
Yes	585 (54.0)	172 (64.4)	413 (50.6)		
Energy intake, kcal*	1517.5±1282.4	1528.8±1495.0	1513.8±1205.8	-0.15	0.882
Salt in seasonings intake, g/d				7.07	0.008
≤5	511 (47.5)	145 (54.5)	366 (45.1)		
>5	566 (52.6)	121 (45.5)	445 (54.9)		
Dietary selenium intake,μg/d				34.57	<0.001
<100	342 (31.6)	123 (46.1)	219 (26.8)		
≥100	742 (68.5)	144 (53.9)	598 (73.2)		

* Values are mean ± SD;

The numbers with missing value were 12 for educational level, 12 for occupation, 32 for BMI, 25 for central obesity, 3 for sleep disturbances, 2 for smoking, 5 for diabetes, 2 for smoking, 7 for salt in seasonings intake, respectively.

Analysis on the association between dietary selenium and MCI

946 participants were enrolled in the calculation of the converted FFQ FCTs. Daily intakes of nutrients assessed by FFQ using WFCT method demonstrated the high correlations with those assessed by 24HRs in CHNS-2018 in Zhejiang, with specific details presented in Supplementary Table 1. Using Converted FFQ FCTs (see Supplementary Table 2, 3), dietary selenium and energy intake were calculated. Based on the results of univariate chi-square analysis results and the existing research evidence, RCS was established for the relationship between the dietary selenium intake and MCI by adjusting the factors including age group, educational level, marriage, depression, BMI, central obesity, frequency of social activities, sleep disturbances, smoking, drink alcohol, diabetes, hypertension, energy intake and salt in seasonings intake in Supplementary Figure 1. Combining the RCS curve with the Recommended Nutrient Intake (RNI) value of selenium in the Dietary Reference Intakes for Chinese Residents[35], the dietary selenium intake was classified into two groups: $< 100 \mu\text{g/d}$ and $\geq 100 \mu\text{g/d}$. All previously mentioned covariates and dietary selenium intake were included in the univariate chi-square analysis and the multivariate analysis, as shown in Table 1 and Figure 3, respectively. Multivariate analysis showed that the dietary intake of selenium of greater than or equal to $\mu\text{g/d}$ (OR = 0.27, 95% CI: 0.19~0.40) was linked to a significantly reduced risk of MCI.

Analysis on the association between hypertension and MCI

Multivariate analysis showed that suffering hypertension (OR = 1.82, 95% CI: 1.30~2.54), age greater than or equal to 75 years (OR = 2.96, 95% CI: 1.90~4.61), suffering depression (OR = 3.55, 95% CI: 1.74~7.27) and drink alcohol (OR = 2.16, 95% CI: 1.38~3.39) were linked to a significantly increased risk of MCI. Frequency of social activities and dietary selenium intake were inversely associated with MCI. The independent effects of hypertension on MCI in both age and multivariate-adjusted models are presented in Table 2. Participants suffering hypertension had an increased risk of MCI with a multivariate OR of 1.67 (exclude dietary selenium intake) and 1.82 (include dietary selenium intake).

Table 2 Odds Ratio of MCI by hypertension

Variables		Normal (N=499)	Hypertension (N=585)	P for Trend
Odds Ratio (95% confidence interval)				
	No adjusted	1.00	1.77 (1.33 ~ 2.36)	<0.0001
	Age adjusted	1.00	1.51(1.12~2.03)	0.006
	Multivariate adjusted*	1.00	1.67(1.21~2.31)	0.002
	Multivariate adjusted†	1.00	1.82(1.30~2.54)	0.0005

*Adjusted for gender, age, educational level, job, marriage, BMI, central obesity, Frequency of social activities, depression, sleep quality impairment, smoke, drink, diabetes, Energy intake, Salt in seasonings intake.

†Adjusted for aforementioned covariates and dietary selenium intake.

Interactive effect of dietary selenium intake and hypertension on MCI

Subgroup analyses of association between hypertension and MCI were conducted based on dietary selenium intake, as showed in Supplementary Figure 2. In the multivariate analysis, it was found that among the participants with a dietary selenium intake of less than $100 \mu\text{g/d}$, hypertension (OR = 2.42, 95% CI: 1.40 - 4.17) were associated with a significantly elevated risk of MCI. However, in the participants with a dietary selenium intake $\geq 100 \mu\text{g/d}$, hypertension did not emerge as determinants of MCI. Through subgroup analysis, it was found that there was a significant interaction ($P < 0.05$) between dietary selenium intake and hypertension in their effects on MCI. Examination of the combined effect of dietary selenium intake and hypertension was shown in Table 3. With the

exception of the hypertension Se intake <100 µg/d group, each group had a statistically significant reduced risk of MCI compared with the normal Se intake <100 µg/d reference group. When the Se intake <100 µg/d group and Se intake ≥100 µg/d group within the hypertension group were compared, the OR greatly decreased from 2.84 to 0.56 ($P<0.05$). Moreover, within the same Se intake level, when the hypertension group were compared with the normal group, there were only small increases in the OR ($P<0.05$). Results of the biological interaction analysis showed that the RERI was -1.389 (-2.574 ~ -0.205) and the AP was -3.165 (-5.739 ~ -0.590). This suggested that hypertension and dietary selenium intake had a negative additive interaction on MCI.

Table 3 Odds Ratio of MCI by both hypertension and dietary selenium intake

Variables		Normal (N=499)		Hypertension (N=585)	
		Se intake <100 µg/d	Se intake ≥100 µg/d	Se intake <100 µg/d	Se intake ≥100 µg/d
Odds Ratio (95% CI)					
	No adjusted	1.00	0.62(0.39~0.98)	2.98(1.88~4.73)	0.88(0.58~1.34)
	Age adjusted	1.00	0.67(0.42~1.06)	2.69(1.68~4.31)	0.79(0.51~1.31)
	Multivariate adjusted*	1.00	0.43 (0.25~0.73)	2.84(1.70~4.74)	0.56 (0.34~0.93)

*Adjusted for gender, age, educational level, Job, marriage, BMI, central obesity, Frequency of social activities, depression, sleep quality impairment, smoke, drink, diabetes, Energy intake, Salt in seasonings intake.

Discussion

Principal Results

Given the current lack of a cure for AD, it is of utmost importance to implement primary prevention measures to identify MCI prior to the onset of AD. This study aimed to explore the effects of dietary selenium intake and hypertension on MCI, along with their interactive effects, thereby achieving precise prevention of MCI. In this study, the prevalence of MCI and hypertension was 24.6% and 54.0%, respectively. The multivariate analysis revealed that the dietary intake of vitamin selenium ≥ 100 µg/d and hypertension were significantly associated with lower and higher prevalence of MCI, respectively. Subgroup analyses indicated that among the participants with a dietary selenium intake ≤ 100 µg/d, hypertension were associated with a significantly elevated risk of MCI. However, in the participants with a dietary selenium intake ≥100 µg/d, hypertension did not emerge as determinants of MCI. Interaction analyses indicated that there was an interactive effect between dietary selenium intake and hypertension on MCI, and the protective effect of dietary selenium intake prevailed. Results of the biological interaction analysis showed that hypertension and dietary selenium intake had a negative additive interaction on MCI.

As early as 2001, it was found that vascular risk factors in middle age may be risk factors for the onset of MCI in later life[36]. Subsequently, some studies reported that active intervention in hypertension may reduce the risk of cognitive impairment or the progression of MCI to AD dementia[37,38]. The finding in this study that hypertension was a potential risk factor for the MCI was consistent with the evidence from previous studies. The risk of MCI in hypertensive individuals was 1.82-fold than that in non - hypertensive individuals, which was similar to the results in other regions or other countries[8,39]. Therefore, ameliorating the risk of MCI in the hypertensive population holds substantial significance. Given the correlation between dietary selenium intake and hypertension[18], this study incorporates dietary selenium intake as a variable to probe into the impact of its interaction with hypertension on MCI.

Comparison with Prior Work

Currently, some research reported that selenium, including blood selenium level and selenium

supplements, may exert a protective effect on cognitive function[14,15]. However, so far, few investigations have been centered around the dietary selenium intake with MCI, much less the dose - response relationship between dietary selenium intake and the risk of MCI. In this study, RCS curve indicated that the elderly with dietary selenium intake $\geq 100 \mu\text{g/d}$ had a reduce risk of MCI, and elderly with dietary selenium intake $< 100 \mu\text{g/d}$ had an elevated risk of MCI. This provides research evidence for the formulation of DRIs of selenium.

In the subgroup with dietary selenium intake $< 100 \mu\text{g/d}$, the risk of MCI in hypertensive individuals was 2.42 times that in non - hypertensive individuals, which was significantly higher than which (OR=1.82) in the overall population. Interaction analysis indicated that there was a negative interactive effect between dietary selenium intake and hypertension on MCI. Dietary selenium intake can weaken or even reverse the impact of hypertension on MCI. This might be related to the protective effect of selenium against hypertension, thus indicating that dietary selenium intake and hypertension might have a potential interactive effect on MCI. However, there are currently no similar studies to verify this conclusion.

The results of the covariate analysis show that aging, having depression symptom, drinking alcohol and few social activities were associated with a significantly elevated risk of MCI. This is consistent with the common risk factors of MCI or cognitive function identified in previous studies, indicating a high level of validity and reliability of the data in this study[40-45]. However, in the univariate correlation analysis, education level, sleep disturbances, and salt intake from seasonings were found to have a significant association with MCI. Nevertheless, they showed no significance in the multivariate analysis. Salt intake, as a major influencing factor of hypertension[46], was likely to be a confounding factor. Including it in the model aimed to adjust for potential confounding factors that may affect hypertension. Sleep disturbances were closely intertwined with depression[47], and there might be collinearity between them. Different educational level, BMI, marriage status and smoking status had been found to influence MCI in previous studies[48-50], while it was not found in this study.

Our study encompasses several notable strengths. Firstly, this research represented the initial attempt to probe into the interaction between hypertension and dietary selenium intake in relation to MCI. Specifically, it endeavored to explore whether dietary selenium intake had the capacity to regulate the impact of hypertension on MCI. Secondly, a converted FFQ Food Composition Tables was developed to assess the dietary nutrients intake. Finally, our study reported quantitative cut-off values regarding the effects of dietary selenium on MCI, providing a more precise understanding of this relationship.

Limitations

Nonetheless, our investigation was not without limitations, and caution must be exercised when interpreting and generalizing the results. First and foremost, the cross - sectional design adopted in this study, although valuable for identifying potential determinants of MCI, inherently precludes the establishment of causal relationships. Consequently, it remains difficult to determine whether suboptimal dietary habits predispose individuals to MCI or if, conversely, the presence of MCI leads to a decline in dietary selenium intake. Secondly, the reliance on self - reported dietary data renders our study vulnerable to recall bias, which result in inaccuracies of our dietary assessments. Thirdly, cognitive status is known to fluctuate over time and in response to different interventions. Since our study employed a single - sampling approach, it was unable to comprehensively capture these dynamic changes. Finally, the restricted coverage areas and relatively small sample sizes in our study raise questions about the generalizability of our findings. Therefore, there is an urgent need for large - scale investigations in the future to validate and extend the results of our current study.

Conclusions

To summarize, this study indicates the prevalence of MCI in elderly aged 55 or above in Zhejiang was 24.6%. Dietary intake of vitamin selenium ≥ 100 $\mu\text{g/d}$ and suffering hypertension were linked to, reduced and increased respectively, risk of MCI. Hypertension and dietary selenium intake had a negative additive interaction on MCI. An appropriate amount of dietary selenium intake may attenuate or even reverse the impact of hypertension on MCI. Future research should prospectively establish causal relationships. Additionally, precise intervention strategies are urgently needed.

Acknowledgements

The authors would like to thank all the participants who took part in this study, especially nutrition monitoring surveyors from local CDCs in 4 regions. In addition, sincere gratitude was given to Wang Le from Zhejiang Cancer Hospital for his support in the suggestion on statistical methods of this article.

Conflicts of Interest

none declared.

Abbreviations

AD: Alzheimer's disease

AP: attributed to interaction

BMI: Body Mass Index

CI: confidence interval

DRIs: Dietary Reference Intakes

FCTs: converted FFQ Food Composition Tables

FFQ: Food Frequency Questionnaire

GDS: Geriatric Depression Scale

MCI: mild cognitive impairment

MOCA: Montreal Cognitive Assessment

MMSE: Mini-Mental State Examination

OR: Odds Ratio

PSQI: Pittsburgh Sleep Quality Index

RCS: Restricted Cubic Spline

RERI: relative excess risk due to interaction

RNI: Recommended Nutrient Intake

Se: selenium

WFCT: Weighted Food Composition Table method

WHO: World Health Organization

24HRs: 24-hour dietary recall

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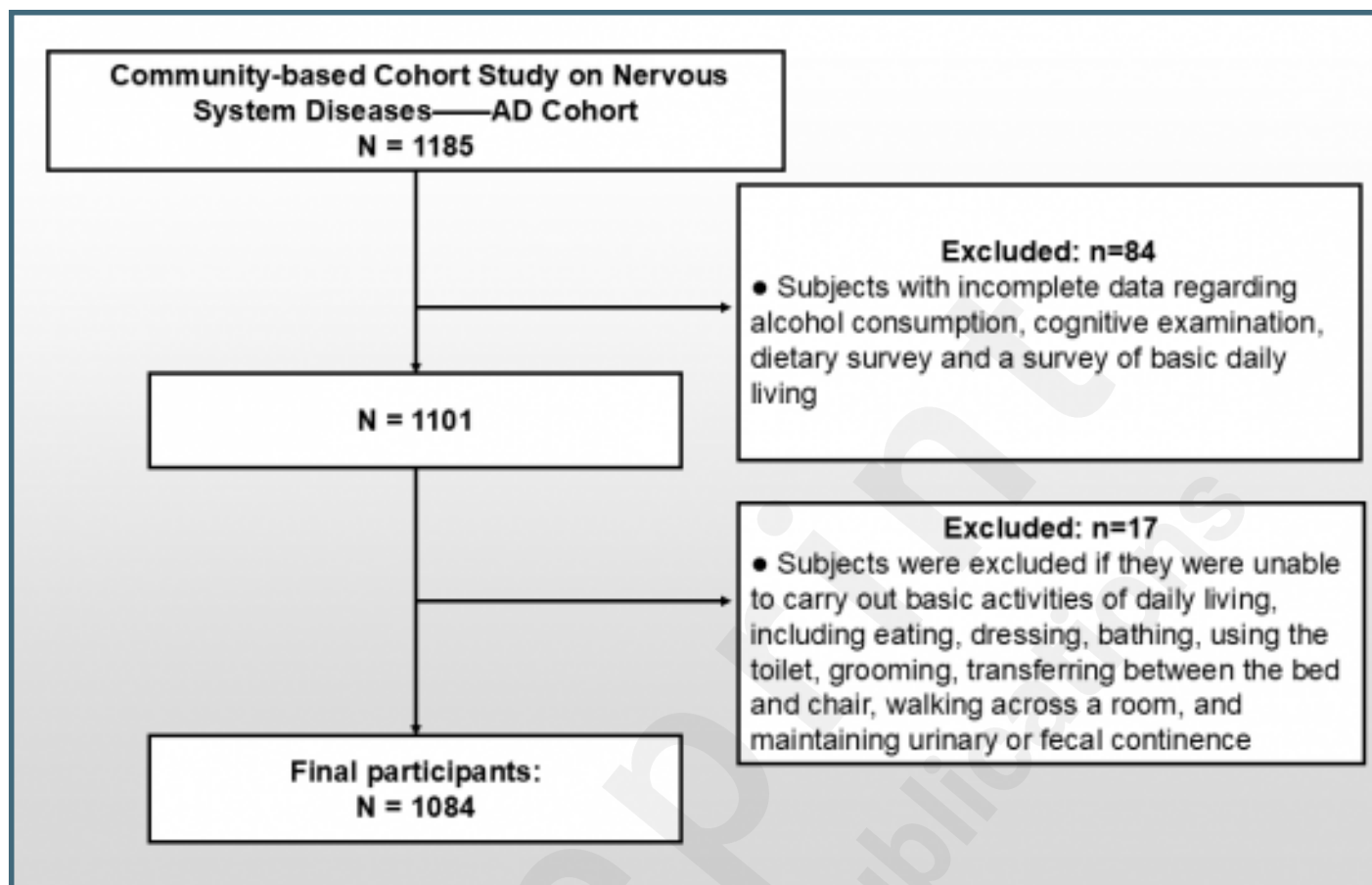
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Supplementary Files

Figures

Flow chart of the analysis sample in this study.



Forest plot of the risk of MCI by multivariate logistic regression model.

