Association between inter-arm blood pressure difference and mild cognitive impairment in rural older adults: a postprint

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Abstract

Background Previous studies have found that inter-arm blood pressure difference (IAD) and mild cognitive impairment (MCI) are both closely associated with cardiovascular risk factors; however, whether an association exists between IAD and MCI remains unclear.

Objective To investigate the relationship between IAD and MCI in rural elderly populations and to provide a scientific basis for elucidating the mechanisms of cognitive decline in older adults.

Methods From July to August 2019, rural elderly individuals aged 60 years and above were selected from 5 towns across 2 counties (districts) in Guizhou Province using a multi-stage cluster sampling method for questionnaire surveys, general physical examinations, cognitive function assessments, and bilateral arm blood pressure measurements. Cognitive function was evaluated using the Mini-Mental State Examination (MMSE), and daily living functional status was assessed using the Activities of Daily Living (ADL) scale. Spearman rank correlation analysis and binary Logistic regression analysis were employed to explore the association between IAD and MCI in the elderly.

Results A total of 1795 questionnaires were distributed. After excluding participants with incomplete questionnaire information, those without blood pressure measurements, and those without blood tests, data from 1088 participants were ultimately included in the analysis. Among the 1088 rural elderly individuals, 138 cases of MCI were identified (12.68%), 99 cases had systolic inter-arm blood pressure difference (sIAD) \$ \$10 mmHg (9.10%), and 80 cases had diastolic inter-arm blood pressure difference (dIAD) \$ \$10 mmHg (7.35%). Compared with individuals having IAD <10 mmHg, those with IAD \$ \$10 mmHg exhibited a higher prevalence of MCI and lower scores in MMSE total score, orientation, language ability, and delayed recall (P<0.05). Correlation analysis revealed that sIAD was negatively correlated with MMSE total score (rs=-0.094), orientation score (rs=-0.082), language ability score (rs=-0.065), and delayed recall score (rs=-0.104) (P<0.05); dIAD was negatively correlated with MMSE total score (rs=-0.080), orientation score (rs=-0.094), and attention-calculation score (rs=-0.063) (P<0.05). Multivariate Logistic regression analysis demonstrated that each 1 mmHg increase in sIAD was associated with an 8.80% increase in MCI risk (OR=1.088, 95%CI=1.046~1.131; P<0.001); sIAD $ $10 mmHg (OR=2.169, 95%CI=1.262~3.728; P<0.05) and dIAD $ $10 mmHg (OR=1.926, 95%CI=1.047~3.542; P<0.05) were independent influencing factors for MCI occurrence in the elderly.

Conclusion The prevalence of MCI among rural elderly populations was 12.68%. Elevated IAD was associated with an increased risk of MCI, with individuals having IAD $ $10 mmHg exhibiting a higher risk of MCI than those with IAD <10 mmHg.

Full Text

Abstract

Background: Previous studies have found that inter-arm blood pressure difference (IAD) and mild cognitive impairment (MCI) are both associated with cardiovascular risk factors, but it is unclear whether there is an association between IAD and MCI. **Objective:** To explore the relationship between IAD and MCI in rural elderly persons and to provide a scientific basis for clarifying the mechanisms of cognitive decline in elderly persons. **Methods:** From July to August 2019, rural elderly residents aged 60 years and older were selected using multi-stage cluster sampling from five townships in two counties (districts) of Guizhou Province. Questionnaire surveys, general physical examinations, cognitive function assessments, and bilateral arm blood pressure measurements were conducted. Cognitive function was evaluated using the Mini-Mental State Examination (MMSE), and activities of daily living were assessed using the Activities of Daily Living (ADL) scale. Spearman rank correlation analysis and binary logistic regression models were used to investigate the association between IAD and MCI in the elderly. **Results:** A total of 1,795 questionnaires were distributed, and data from 1,088 participants were finally included after excluding subjects with incomplete questionnaire information, those who did not undergo blood pressure measurements, and those who did not undergo blood tests. Among the 1,088 rural elderly residents, 138 patients (12.68%) with MCI were detected, 99 patients (9.10%) had systolic inter-arm blood pressure difference (sIAD) $\geq$ 10 mmHg, and 80 patients (7.35%) had diastolic inter-arm blood pressure difference (dIAD) $\geq$ 10 mmHg. Compared with individuals with IAD $<$ 10 mmHg, those with IAD $\geq$ 10 mmHg had a higher prevalence of MCI and lower scores in MMSE total score, orientation, language ability, and delayed recall (P $<$ 0.05). Correlation analysis showed that sIAD was significantly negatively associated with MMSE total score (rs = -0.094), orientation score (rs = -0.082), language ability score (rs = -0.065), and delayed recall score (rs = -0.104) (all $P < 0.05$); dIAD was significantly negatively associated with MMSE total score (rs = -0.080), orientation score (rs = -0.094), and attention/calculation score (rs = -0.063) (all $P < 0.05$). Multivariate logistic regression analysis showed that for each 1 mmHg increase in sIAD, the risk of MCI increased by 8.80% (OR = 1.088, 95%CI = 1.046–1.131; $P < 0.001$); sIAD $\geq$ 10 mmHg (OR = 2.169, 95%CI = 1.262–3.728; $P < 0.05$) and dIAD $\geq$ 10 mmHg (OR = 1.926, 95%CI = 1.047–3.542; $P < 0.05$) were influencing factors for MCI in the elderly. **Conclusion:** The prevalence of MCI in rural elderly was 12.68%, and elevated IAD was associated with an increased risk of MCI. The risk of MCI was higher in elderly with IAD $\geq$ 10 mmHg than in those with IAD $<$ 10 mmHg.

Keywords: Mild cognitive impairment; Inter-arm blood pressure difference; Rural; Aged; Cross-sectional study

Introduction

Mild cognitive impairment (MCI) represents a transitional state between normal aging and dementia, characterized by progressive decline in memory or other cognitive functions without affecting daily living abilities and not meeting diagnostic criteria for dementia, essentially constituting a preclinical prodromal phase of dementia [1]. Research indicates that the risk of MCI progressing to dementia is significantly higher than in cognitively normal older adults, although some individuals may revert to normal cognitive status. Therefore, early identification and effective intervention of MCI can reverse or slow the progression of cognitive dysfunction and the onset of dementia [2].

From current research trends, cardiovascular risk factors remain a hot topic in MCI etiology studies, particularly hypertension [3]. As research on the relationship between blood pressure and cognitive dysfunction deepens, researchers have begun focusing on the correlation between a blood pressure-related physiological indicator—inter-arm blood pressure difference (IAD)—and cognitive function [4]. IAD refers to the blood pressure difference between the left and right arms due to human anatomical structure and certain pathological factors, including systolic inter-arm blood pressure difference (sIAD) and diastolic inter-arm blood pressure difference (dIAD) [5]. In clinical practice, IAD is commonly used to evaluate arterial stiffness and abnormal vascular function, and extensive literature has demonstrated that larger IAD is associated with cardiovascular disease, arterial sclerosis, and related health problems [5].

Currently, evidence regarding the association between IAD and cognitive dysfunction is limited to a few foreign reports. One study suggested that IAD $\geq$ 5 mmHg may be associated with cognitive decline in elderly populations [4]. Another Framingham Heart Cohort study found that IAD was associated with a higher future risk of Alzheimer's disease only in elderly individuals carrying the apolipoprotein E (APOE) 4 allele, but not in the entire study population [6].

Given the high incidence of cognitive dysfunction among elderly people in rural China, this study selected rural elderly in Guizhou as the research subjects to explore the relationship between IAD and MCI in this population, which may help identify high-risk groups for MCI and provide a basis for early prevention of cognitive decline and improvement of quality of life among older adults.

1. Subjects and Methods

1.1 Study Subjects

From July to August 2019, a multi-stage cluster random sampling method was used to select rural elderly residents aged 60 years and older from five townships in two counties (districts) of Guizhou Province. Based on geographical location and economic development status, Guiyang City and Qiannan Prefecture in Guizhou Province were selected as primary sampling units. Two counties (districts) were then randomly selected from these two prefecture-level cities as secondary sampling units, and finally five townships were randomly selected from these two counties (districts) as survey sites. All elderly residents in these townships who signed informed consent forms were included as survey subjects.

Inclusion criteria: (1) Age $\geq$ 60 years; (2) Continuous residence in the survey location for more than six months. **Exclusion criteria:** (1) Individuals with severe visual or auditory impairment, physical disability, aphasia, or other conditions preventing cooperation with questionnaires and physical examinations; (2) Individuals already diagnosed with dementia or other psychiatric disorders.

This study was approved by the Ethics Committee of Guizhou Medical University (Approval No.: 2017 Ethics Review No. 49), and all subjects or their guardians signed informed consent forms.

1.2 Survey Methods

1.2.1 Survey Procedure With the informed consent of participants, this study employed one-on-one, face-to-face interviews. Based on the actual conditions of each survey site, both centralized and door-to-door approaches were used to conduct questionnaires, cognitive function assessments, bilateral arm blood pressure measurements, and physical examinations. All survey personnel underwent rigorous training, and the same personnel remained fixed throughout the entire survey process.

1.2.2 Survey Content **(1) General data collection:** A standardized structured questionnaire was used to collect information on gender, age, ethnicity, occupation, education level, marital status, smoking, alcohol consumption, physical exercise, and chronic disease status. Physical measurements including height and body weight were collected through physical examinations.

(2) Cognitive function assessment: The Chinese version of the Mini-Mental State Examination (MMSE) revised by Zhang Mingyuan was used to assess cognitive function. The MMSE is an internationally recognized cognitive impairment screening tool comprising five domains: orientation (10 points), immediate memory (3 points), attention/calculation (5 points), language ability (9 points), and delayed recall (3 points), with total scores ranging from 0 to 30. Lower scores indicate worse cognitive function. The scale's Cronbach's α coefficient is 0.890, and its test-retest reliability ranges from 0.80 to 0.99 [7].

(3) Activities of daily living assessment: The Activities of Daily Living (ADL) scale was used to evaluate daily functioning. The ADL includes 14 items, each scored as "can do by myself" (1 point), "some difficulty" (2 points), "needs help" (3 points), or "cannot do at all" (4 points). A score of 1 indicates normal daily functioning, while scores of 2–4 indicate functional decline [8].

(4) IAD measurement: A Japanese Omron arteriosclerosis detection device (HBP-8000) was used for measurement at room temperature. Before measurement, participants' questionnaire numbers, age, gender, height, and other information were entered. On the day of testing, participants were advised to avoid smoking, alcohol, coffee, and overeating, and to sit quietly for at least 15 minutes before measurement. During measurement, participants were required to lie flat without a pillow, remain quiet, place both hands palm-up beside their bodies, with cuffs attached to both upper arms to simultaneously measure bilateral arm blood pressure. Measurements were repeated twice, and the average values were used as the final results to calculate IAD.

1.3 Assessment Criteria

1.3.1 MCI Assessment Criteria This study diagnosed MCI based on criteria from Frisoni et al. [9] combined with the "2018 Chinese Guidelines for the Diagnosis and Treatment of Dementia and Cognitive Impairment" [10]. Participants were diagnosed with MCI if they simultaneously met both of the following conditions: (1) MMSE score $\leq$ 1.0 SD below the age- and education-matched MMSE mean; (2) Basic normal daily living ability, i.e., ADL score $<$ 22 points.

1.3.2 IAD Assessment Criteria IAD (mmHg) = |right arm systolic (diastolic) pressure − left arm systolic (diastolic) pressure|. According to the latest Chinese expert consensus on "Clinical Application of Simultaneous Four-Limb Blood Pressure and Brachial-Ankle Pulse Wave Velocity Measurement" [11], abnormal IAD was defined as IAD $\geq$ 10 mmHg (1 mmHg = 0.133 kPa), including sIAD $\geq$ 10 mmHg and dIAD $\geq$ 10 mmHg.

1.3.3 Relevant Variable Definitions

(1) **Smoking** was defined as $\geq$ 1 cigarette per day for more than six months. (2) **Alcohol consumption** was defined as drinking at least once per week for more than six months. (3) **BMI** = weight (kg) / height (m)^2. According to the "Guidelines for Prevention and Control of Overweight and Obesity in Chinese Adults," BMI $\geq$ 28 kg/m^2 was defined as obesity [12].

(4) **Hypertension** was defined according to the "Chinese Guidelines for Prevention and Treatment of Hypertension (2018 Edition)" [13] as systolic pressure $\geq$ 140 mmHg and/or diastolic pressure $\geq$ 90 mmHg, or a history of hypertension currently using antihypertensive medication even if blood pressure was below 140/90 mmHg. (5) **Diabetes** was defined according to the "Chinese Guidelines for Prevention and Treatment of Type 2 Diabetes (2017 Edition)" [14] as fasting blood glucose $\geq$ 7.0 mmol/L, or normal blood glucose with a history of diabetes or current use of hypoglycemic medication. (6) **Dyslipidemia** was defined as total cholesterol $\geq$ 6.22 mmol/L, or triglycerides $\geq$ 2.26 mmol/L, or low-density lipoprotein cholesterol $\geq$ 4.14 mmol/L, or high-density lipoprotein cholesterol $<$ 1.04 mmol/L [12].

1.4 Quality Control

Design phase: The questionnaire was repeatedly revised, supplemented, and improved through pilot surveys and expert evaluation. Surveyors received standardized training to clarify survey tasks and standardize scale completion criteria. **Implementation phase:** Questionnaire surveys, physical examinations, and bilateral arm blood pressure measurements were all conducted strictly according to standards. The same survey personnel remained unchanged throughout the entire process, and two reviewers conducted on-site audits after questionnaire completion to ensure completeness. **Data processing and analysis phase:** Double data entry by two independent personnel was performed, followed by consistency checks to ensure data authenticity and accuracy.

1.5 Statistical Analysis

R software (version 4.3.2) was used for data analysis. Normally distributed or approximately normally distributed measurement data were expressed as ($\bar{x} \pm$ s), while non-normally distributed measurement data were expressed as M (P25, P75). Between-group comparisons used t-tests or rank-sum tests. Count data were expressed as relative numbers, with between-group comparisons using ^{2} tests. Spearman rank correlation analysis was used to explore the correlation between IAD as a continuous variable and cognitive function and its domain scores. Binary logistic regression models were used to calculate odds ratios (OR) and 95% confidence intervals (CI) to evaluate the association between IAD and MCI. The significance level for two-sided tests was $\alpha = 0.05$.

2. Results

2.1 Basic Characteristics of Survey Subjects

A total of 1,795 questionnaires were distributed. After excluding subjects with incomplete questionnaire information, those without blood pressure measurements, and those without blood tests, data from 1,088 participants were finally included in the study. Among the 1,088 rural elderly participants, 461 were male (42.37%) and 627 were female (57.63%). Ages ranged from 60 to 96 years, with an average age of (71.2 ± 6.4) years. The majority were Han ethnicity (557 people, 51.19%). Most had education levels below primary school (839 people, 77.11%). The majority were married (673 people, 61.86%) and worked as farmers (992 people, 91.18%).

2.2 Distribution of MCI Prevalence Among Elderly with Different Characteristics

The average MMSE score of survey subjects was (20.90 ± 5.48) points. A total of 138 MCI patients were detected, yielding a prevalence rate of 12.68%. MCI prevalence was significantly higher among ethnic minorities, farmers, those lacking physical exercise, and those with hypertension ($P < 0.05$). No statistically significant differences in MCI prevalence were found between different genders, age groups, education levels, marital statuses, smoking statuses, alcohol consumption statuses, BMI categories, diabetes statuses, dyslipidemia statuses, or cardiovascular disease statuses ($P > 0.05$) .

2.3 Relationship Between IAD and Cognitive Function and Domain Scores

The average sIAD was (4.4 ± 4.0) mmHg, with 99 cases (9.10%) having sIAD ≥ 10 mmHg. The average dIAD was (4.0 ± 3.9) mmHg, with 80 cases (7.35%) having dIAD ≥ 10 mmHg. Thirty-four individuals (3.13%) had both sIAD and dIAD ≥ 10 mmHg. Compared with the sIAD < 10 mmHg group, the sIAD ≥ 10 mmHg group had higher MCI prevalence and lower MMSE total scores, orientation scores, and delayed recall scores ($P < 0.05$). Compared with the dIAD < 10 mmHg group, the dIAD ≥ 10 mmHg group had higher MCI prevalence and lower MMSE total scores, orientation scores, language ability scores, and delayed recall scores ($P < 0.05$). Compared with the group with both sIAD and dIAD < 10 mmHg, the group with both sIAD and dIAD ≥ 10 mmHg had lower MMSE total scores, orientation scores, language ability scores, and delayed recall scores ($P < 0.05$) .

2.4 Correlation Analysis Between sIAD, dIAD and Cognitive Function Domain Scores

Spearman rank correlation analysis showed that sIAD was negatively correlated with MMSE total score (rs = -0.094), orientation score (rs = -0.082), language ability score (rs = -0.065), and delayed recall score (rs = -0.104) ($P < 0.05$). dIAD was negatively correlated with MMSE total score (rs = -0.080), orientation score (rs = -0.094), and attention/calculation score (rs = -0.063) ($P < 0.05$) .

2.5 Multivariate Logistic Regression Analysis of the Correlation Between IAD and MCI

Using MCI status as the dependent variable (0 = no, 1 = yes) and sIAD and dIAD as independent variables (using actual measured values), binary logistic regression analysis was performed while controlling for potential confounders identified in univariate analysis ($P < 0.1$) and age, which is closely related to cognitive impairment in previous research. The results showed that in Model 1 (without confounder adjustment), each 1 mmHg increase in sIAD increased MCI risk by 7.70% (OR = 1.077, 95%CI = 1.038–1.118; $P < 0.001$). In Model 2, adjusting for cardiovascular risk factors including alcohol consumption (no = 0, yes = 1), physical exercise (no = 0, yes = 1), and hypertension (no = 0, yes = 1), each 1 mmHg increase in sIAD increased MCI risk by 7.90% (OR = 1.079, 95%CI = 1.039–1.121; $P < 0.001$). Model 3 further adjusted for age (60–69 years = 1, 70–79 years = 2, 80+ years = 3), gender (male = 1, female = 2), ethnicity (Han = 0, minority = 1), and occupation (non-farmer = 0, farmer = 1). The results showed that each 1 mmHg increase in sIAD increased MCI risk by 8.80% (OR = 1.088, 95%CI = 1.046–1.131; $P < 0.001$). No significant association was found between dIAD and MCI prevalence regardless of confounder adjustment ($P > 0.05$).

Using MCI status as the dependent variable (0 = no, 1 = yes) and sIAD and dIAD groups as independent variables (assignment: < 10 mmHg = 0, ≥ 10 mmHg = 1), binary logistic regression analysis was performed while controlling for age and variables with $P < 0.1$ in univariate analysis. The results showed that in Model 1 (without confounder adjustment), the risk of MCI in individuals with sIAD ≥ 10 mmHg was 2.007 times that of those with sIAD < 10 mmHg (OR = 2.007, 95%CI = 1.194–3.372; $P < 0.05$); the risk of MCI in individuals with dIAD ≥ 10 mmHg was 1.816 times that of those with dIAD < 10 mmHg (OR = 1.816, 95%CI = 1.017–3.241; $P < 0.05$). In Model 2, adjusting for alcohol consumption, physical exercise, and hypertension, individuals with sIAD ≥ 10 mmHg had higher MCI risk (OR = 1.996, 95%CI = 1.174–3.396; $P < 0.05$) compared with those with sIAD < 10 mmHg; similarly, individuals with dIAD ≥ 10 mmHg had higher MCI risk (OR = 1.850, 95%CI = 1.021–3.351; $P < 0.05$) compared with those with dIAD < 10 mmHg. Model 3 further adjusted for age, gender, ethnicity, and occupation, and found that sIAD ≥ 10 mmHg remained associated with higher MCI risk (OR = 2.169, 95%CI = 1.262–3.728; $P < 0.05$), and dIAD ≥ 10 mmHg was also associated with higher MCI risk (OR = 1.926, 95%CI = 1.047–3.542; $P < 0.05$). No significant association was found between having both sIAD and dIAD ≥ 10 mmHg and MCI prevalence regardless of confounder adjustment ($P > 0.05$) .

Discussion

As the population aging process continues to deepen, the number of MCI patients is growing rapidly. Studies both domestically and internationally have shown that MCI prevalence ranges from 2.5% to 20.80%. The prevalence of MCI among elderly people in rural Guizhou in this survey was 12.68% (138/1,088), which is similar to the prevalence among elderly people aged $\geq$ 60 years in Zhangjiakou City (12.20%) [15], higher than the detection rate among elderly people in Kunming (9.70%) [16], but lower than the prevalence among rural elderly in Shanxi (17.6%) [17]. These differences in prevalence may be related to variations in survey methods, diagnostic criteria, screening tools, survey subjects, economic levels, and cultural backgrounds. Additionally, this study found that MCI prevalence was higher among ethnic minorities, farmers, those who consume alcohol, those lacking physical exercise, and those with hypertension, consistent with previous literature [18-19]. The higher MCI prevalence among ethnic minorities compared with Han Chinese may be related to differences in lifestyle habits, living environments, and genetic factors among different ethnic groups [20]. Secondly, compared with farmers engaged primarily in physical labor, those engaged in mental labor have continuous stimulation of cognitive function and are less likely to develop cognitive impairment [18]. Research has shown that cardiovascular risk factors such as alcohol consumption, lack of physical exercise, and hypertension can promote the formation and development of atherosclerosis, damage the nervous system, and thus increase the risk of cognitive dysfunction [21-22].

Previous studies have shown that IAD is closely related to cardiovascular health [23], so exploring the etiological clues of cognitive dysfunction from the perspective of IAD has begun to attract attention from some scholars [4]. The results of this study show that among rural elderly people aged 60 years and above, the prevalence of MCI in individuals with IAD $\geq$ 10 mmHg was significantly higher than in the control group, with lower scores in MMSE total score, orientation, language ability, and delayed recall. Furthermore, correlation analysis showed that IAD was negatively correlated with MMSE total score, orientation score, attention/calculation score, language ability score, and delayed recall score, suggesting that increased IAD may affect cognitive function status. Zhang et al. [24] found that cerebral microbleeds are associated with cognitive domain impairments including visuospatial and executive function, orientation and abstraction, delayed memory, language ability, and attention. IAD has been confirmed to be positively correlated with the risk of cerebral small vessel disease [25], suggesting that IAD may affect cognitive function and its various domains by influencing cerebral small vessels.

This study analyzed IAD as both a continuous variable and a binary variable in multivariate logistic regression analyses to explore the association between IAD and MCI. The results showed that after fully adjusting for relevant confounders, each 1 mmHg increase in sIAD increased the risk of MCI by 8.80%; the risk of MCI in individuals with sIAD $\geq$ 10 mmHg was 2.169 times that of those with sIAD $<$ 10 mmHg; and the risk of MCI in individuals with dIAD $\geq$ 10 mmHg was 1.926 times that of those with dIAD $<$ 10 mmHg. Clark et al. [4] conducted a cohort study on Italian elderly people aged 65 years and above and reached similar conclusions, finding that IAD $\geq$ 5 mmHg was associated with cognitive decline in elderly populations, and when considering declines in comprehensive scores including trail making tests, this association was also observed for IAD $\geq$ 10 mmHg and when IAD was treated as a continuous variable. The possible reasons are as follows: First, similar blood pressure in both arms is the result of hemodynamic stability from the body's micro-regulation. Higher IAD suggests that the patient's blood pressure is in an unstable state, which can lead to changes in hemodynamics, cause vascular endothelial injury, cerebral microvascular disease, and structural and functional brain damage, thereby resulting in cognitive dysfunction [26]. Second, studies have proven that stenosis of the proximal aorta, brachiocephalic artery, and subclavian artery can lead to larger IAD [27]. Therefore, large blood pressure differences may reduce cerebral blood flow and perfusion, and this hemodynamic functional change or perfusion insufficiency may play a role in cognitive decline [28]. Additionally, cardiovascular risk factors are established independent risk factors for MCI [29], and IAD's association with higher risks of arteriosclerosis, hypertension, diabetes, and obesity has been confirmed by numerous studies [30-31]. Therefore, it can be speculated that the association between IAD and MCI may be closely related to these cardiovascular risk factors. Since the association between IAD and cognitive function has not been extensively studied, more basic research is needed to understand its underlying mechanisms.

This study is a cross-sectional study, so it cannot establish causality between IAD and MCI. Further prospective studies are needed to analyze the longitudinal relationship between IAD and MCI. Additionally, all participants in this study were from rural areas of Guizhou Province, and the study population may differ from other regions in terms of economic level, lifestyle, and healthcare, which may limit the generalizability of the findings. The conclusions can be validated through further research in populations with different characteristics.

Conclusion

The prevalence of MCI among elderly people aged 60 years and above in rural Guizhou was 12.68%, which is at a moderate level. IAD was negatively correlated with MMSE total score, orientation, attention/calculation, language ability, and delayed recall scores. IAD $\geq$ 10 mmHg was associated with an increased risk of MCI. Current etiological evidence indicates that the onset and progression of MCI are influenced by multiple factors, including sociodemographic characteristics, lifestyle behaviors, psychosocial factors, genetics, and cardiovascular risk factors. After analyzing these common risk factors affecting cognitive function, this study found an association between IAD and MCI, suggesting that IAD may be an etiological clue for MCI in rural elderly people aged 60 years and above. Given the lack of effective treatments for diagnosed dementia, prevention and reduction of cognitive decline remain the focus, making early screening and diagnosis particularly important. IAD can provide a simple reference for early assessment of MCI risk and offer a basis for early identification and management of high-risk MCI populations and prevention or delay of progression to dementia.

Author Contributions: Wu Qingyue proposed the main research objectives, was responsible for study conception and design, analyzed statistical data, and wrote the manuscript. Wu Qingyue, Chen Xiaoling, and Zhou Xunqiong collected, organized, and entered data. Yang Jingyuan and Zhou Quanxiang were responsible for overall coordination and arrangement of the survey site. Yang Xing revised the manuscript, was responsible for quality control and review, provided overall guidance and supervision for the study, and took overall responsibility for the article.

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