Int J Clin Exp Med 2015;8(8):13891-13900
www.ijcem.com /ISSN:1940-5901/IJCEM0009990

Original Article

Mild cognitive impairment risk factor survey of the Xinjiang Uyghur and Han elderly

Kabinuer Keyimu, Xiao-Hui Zhou, Hai-Jun Miao, Ting Zou

The First Department of Cadre, First Affiliated Hospital of Xinjiang Medical University, Urumqi 830054, China

Received May 7, 2015; Accepted June 24, 2015; Epub August 15, 2015; Published August 30, 2015

Abstract: To understand risk factors of the Xinjiang Uyghur, Han two ethnic elderly with mild cognitive impairment (mild cognitive impairment, MCI), and provide evidence for in-depth study of the causes and prevention of MCI. The MCI epidemiological survey was based on Xinjiang Uyghur and Han residents with 60 years of age or older. The total number of participants is 5398, including 3931 Uyghur residents, and 1467 Han residents. There are 456 participants with MMSE score 2 points above the demarcation points, excluded from the survey for dementia, cerebrovascular disease and other central nervous system disorders, according to case-control study method of random selection in epidemiological survey. In accordance with the clinical diagnostic criteria of MCI, which is from Disorder Diagnostic and Statistical Manual (the revised version of the fourth edition (DSM-IV) from of the American Psychiatric Association, there are 305 cases of MCI, including 159 cases of Han, 146 cases of Uyghur. In the Han groups: univariate analysis showed a correlation ($P < 0.05$) between sex, age, blood pressure, triglyceride (TG), low density lipoprotein (LDL-ch) and MCI. Multivariate Logistic regression analysis showed: age, hypertension, TG, LDL-ch (increased) may increase the risk of MCI (OR values were: 1.115, 1.981, 1.315, 1.495, with $P < 0.05$). In the Uyghur groups: univariate analysis showed a correlation ($P < 0.05$) between age, gender, hypertension, abnormal glucose metabolism, TG, TC, LDL-ch and MCI. Multivariate Logistic regression analysis showed: age, hypertension, abnormal glucose metabolism, TG, TC, LDL-ch (increased), women have a higher risk of MCI (OR values were: 1.063, 2.145, 2.879, 2.078, 1.429, 1.485, 0.462, $P < 0.05$). Age, hypertension, TG and LDL-ch are risk factors of MCI for Han population, while age, hypertension, abnormal glucose metabolism, TG, TC and LDL-ch are risk factors of MCI for Uyghur population.

Keywords: Uyghur, Han, mild cognitive impairment, risk factors

Introduction

MCI, involves mild memory impairment or a particular cognitive dysfunction, is a state between normal elderly and dementia. Individuals in this state have cultural memory impairment, but do not reach the diagnostic criteria for dementia. Not yet formed a definite disease entity, elderly with MCI is widely reco gnized clinical entity or a group of clinical symptoms. Barker [1], found that the incidence of MCI for individuals whose age range from 50-95 is between 5.8%-18.5% due to different stages of memory. Zhou Xiaohui et al [2] reported that Xinjiang Uyghur and Han ethnic elderly population have a total crude prevalence of MCI 10.21%.

With further research, we have come to realize that MCI is a multifactorial pathogenesis. The risks of MCI are related to biological factors, social psychology factors, metabolic factors, cardiovascular and genetic factors and other factors. The therapeutic intervention to MCI may delay or even abort the occurrence of dementia. However, there is no consensus in academia of the treatment that is used to carry out effective interventions. The key to prevent MCI is to control the occurrence of risk factors for MCI, including medically treating hypertension and diabetes, controlling high cholesterol, smoking and obesity, exercise. All these activities will improve physical and mental health and will help to prevent the development of MCI.

On the basis of epidemiological investigation, we performed a case-control study to investigate risk factors for MCI among different ethnic groups in Xinjiang region, provided the basis for in-depth study of MCI.

Materials and methods

Study subjects

All subjects are from July 2009 to October 2011 epidemiological survey. The geographic areas of the survey include the southern Xinjiang, eastern Xinjiang, and northern Xinjiang. The representative city areas are: Moyu County, Hotan, Shanshan County in Turpan and Urumqi. The total number of subjects is 5398. All the subjects, including 3,931 Uyghurs and 1467 Han, were selected from residents of the region, who were age of 60 years or older. There are 456 participants with MMSE score 2 points above the demarcation points, excluded from the survey for dementia, cerebrovascular disease and other central nervous system disorders, according to case-control study method of random selection in epidemiological survey. In accordance with the clinical diagnostic criteria of MCI, which is from Disorder Diagnostic and Statistical Manual (the revised version of the fourth edition (DSM-IV) from of the American Psychiatric Association, there are 305 cases of MCI, including 159 cases of Han, 146 cases of Uyghur.

Methods and content

Survey methodology

On-site household survey and questionnaire are both applied Xinjiang regional epidemiological investigation, multi-stage stratified cluster sampling method is used for sampling. At the first stage there was an inquiry using the Mini Mental State Examination (MMSE) to screen MCI patients. At the second stage, to individuals who show significantly impaired memory or have MMSE scale scores below the minimum limits, we did medical history collection, neuropsychological tests, and clinical physical examination. With reference to of the diagnostic criteria for mild cognitive impairment from the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (4th Revision (DSM-IV)), each MCI case is diagnosed based on medical history, various Scale test scores, physical examination, and a comprehensive analysis by Xinjiang Medical College Elderly medical group.

Survey content

All survey subjects were asked for date of birth, education level, gender, race gender, occupation, marital status, medical history and family history (such as dementia, Parkinson's, hypertension, etc.) and other general information; and simultaneous did abdominal circumference, height, head circumference, weight, blood pressure and other systemic physical examinations. Other examinations include: neurological examination, simultaneously lipids (triglycerides, total cholesterol, LDL, HDL), fasting blood glucose measurement. For subjects with a history of heart disease, or subjects found with arrhythmia, cardiovascular disease during the physical examination, coronary heart electrocardiogram examination was performed. Chinese version of the MMSE was conducted for screening survey, to subject who are illiterate, MMSE scores are between 18 to 21 points, to subject who had Primary education MMSE scores are between 21 and 24 points, to subject who attended middle school or higher MMSE scores re between 25 to 27 pointss. Further examination was applied based on the Chinese version Hajinsiji ischemia Index Scale (HIS), the overall decline Scale (GDS), Clinical Dementia Rating Scale (CDR), Hamilton Depression Scale (HAMD) test and the diagnostic criteria from DSM-IV of the degree of cognitive dysfunction.

MCI DSM-IV diagnostic criteria

There is an objective examination of the evidence of mild cognitive impairment, according to MMSE scores (illiteracy less than 17 points, 20 points lower than primary education, secondary education is less than 24 minutes), and the GDS scores of 2~3. The subjective feeling of memory loss. The course is more than three months. HIS scale is less than or equal to 4 points, cognitive decline excluding specific causes. Living and social activity fall. Does not meet the diagnostic criteria for dementia (CDR scale = 0.5). Each of the MCI cases were consistent with the above six diagnostic criteria and examined by Xinjiang Medical Gerontology Research Group based on scale test scores, medical history, physical examination, comprehensive analysis.

Exclusion criteria

Exclude subjects with congenital mental retardation or mental illness history. Exclusion of nervous system disorders which cause brain dysfunction, such as cerebral hemorrhage, cerebral infarction, Parkinson's disease, brain tumors, etc. Exclusion of depression disease.

Table 1. Univariate analysis of factors related to the Han MCI (count data) (case, %)

Index		Case group	Control group	$\div^2/Z$	*P* values
Gender	Male	69 (43.4%)	91 (38.7%)	0.859	0.354
	Female	90 (56.6%)	144 (61.3%)		
Hypertension	Yes	107 (67.3%)	108 (46.0%)	17.417	0.00 0
	No	52 (32.7%)	127 (54.0%)		
Abnormal glucose metabolism	Yes	50 (31.4%)	84 (35.7%)	0.781	0.377
	No	109 (68.6%)	151 (64.3%)		
Education	Illiteracy	47 (29.6%)	72 (30.6%)	-0.91 0	0.928
	Primary school	52 (32.7%)	66 (28.1%)		
	Middle school	38 (23.9%)	76 (32.3%)		
	High school and above	22 (13.8%)	21 (9.0%)		
Marital status	Single	0 (0%)	1 (0.4%)	1.586	0.801
	Married	138 (86.8%)	195 (83%)		
	Divorce	1 (0.6%)	2 (0.9%)		
	Widowed	20 (12.6%)	37 (15.7%)		
Smoke	Yes	34 (21.4%)	67 (28.5%)	2.528	0.112
	No	125 (78.6%)	168 (71.5%)		
Drinking	Yes	6 (3.8%)	10 (4.3%)	0.056	0.812
	No	153 (96.2%)	225 (95.7%)		

Exclusion of subjects with severe heart and lung and kidney dysfunction, severe infectious diseases, endocrine diseases and severe toxic encephalopathy. Exclude subjects with drug or alcohol dependence in the past six months. Exclude subjects with the history of head trauma, special drug use.

Part of the definition of the relevant factors and related indicators measuring MCI norms

Weight: Subjects of the survey were required to fast in the morning, empty the bladder, and take off the shoes. The readings accuracy is to 0.1 kg.

Height: Shoes are required to be off, professional equipment was applied, and the readings accuracy is to 0.001 m.

Smoking: Smoking is defined as at least one per day, and there is more than one year smoking history.

Drinking: Drinking is defined as drink alcohol for 50 ml or more per week and drink wine at least once per week, sustained more than six months. If there are subjects drinking non-strong alcohol beverages (including red wine, etc.), the alcohol content will be recalculated into liquor. Subjects meeting the above conditions are known as alcohol exposure.

Abnormal glucose metabolism: Those who have been diagnosed with diabetes; have had a history of abnormal glucose metabolism; fasting plasma glucose ≥ 5.6 mmol/L.

Blood pressure: The fourth edition of the People's Health Publishing House "Diagnosis" standard method of measurement is applied, while using conventional mercury sphygmomanometer cuff, respondents should be measured in the resting state, and systolic blood pressure measured and diastolic blood pressure. Hypertension: diagnosed hypertension in the past; standard Chinese Hypertension Prevention Guide Revision Committee established in 2004: systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg.

Biochemical indicators of measurement requirements: All respondents were asked the day before not to eat greasy food but bland diet. In the early morning of examination day, subjects were taken blood 5 ml, and the serum for testing blood sugar, blood lipids and other biochemical indicators. All tests were measured using automatic biochemical analyzer quality standard.

Statistical methods

A survey forms are put into a unified coding database in Excel. Software SPSS13.0 is used

Table 2. Univariate analysis of factors related to the Han MCI (measurement data)

Index	Case group ($\bar{x} \pm S$)	Control group ($\bar{x} \pm S$)	*t*	*P* values
Age	71.0 7 ± 6.81	67.0 ± 4.90	-6.479	0.00 0
BMI	25.18 ± 3.65	25.86 ± 3.83	1.759	0.079
Abdominal circumference	87.74 ± 9.55	88.98 ± 9.66	1.257	0.21
TG (mmol/L)	1.83 ± 1.14	1.53 ± 0.93	-2.765	0.006
TC (mmol/L)	4.86 ± 1.15	4.69 ± 0.87	-1.554	0.121
HDL-ch (mmol/L)	1.41 ± 0.35	1.37 ± 0.33	-1.126	0.261
LDL-ch (mmol/L)	3.28 ± 0.84	3.00 ± 0.73	-3.515	0.00 0

Table 3. MCI multivariate Logistic regression analysis for Han group

Factor	â	SE	Wald	OR (95% CI)	*P* values
Age	0.109	0.020	29.621	1.115 (1.072-1.159)	0.00 0
Hypertension	0.683	0.229	8.889	1.981 (1.264-3.104)	0.003
TG (mmol/L)	0.274	0.110	6.173	1.315 (1.060-1.632)	0.013
LDL-ch (mmol/L)	0.402	0.146	7.533	1.495 (1.122-1.992)	0.006

Note: Medical multivariate statistical analysis methods. Chen Feng, Beijing: China Statistics Press, 2000.12: 89-90.

for multiple tests: chi-square test for count data including gender, hypertension and glucose; rank test for educational level; t test for age, BMI, triglycerides Sarkozy and other measurement data with common variance, t' test for different variances. Normally distributed data are expressed as mean ($\bar{x}$) ± standard deviation (s) Represents. For which the difference was statistically significant we applied multivariate Logistic regression analysis.

Results

General

The total of number of subjects with MCI is 305 from this epidemiological survey, of which there are 159 cases of Han, aged 60 to 89 years, the average age is (71.07 + 6.81); there are 146 cases of Uyghur, aged 60 to 97 years, the average age is (70.89 + 8.69). There are 456 subjects in the control group, of which 236 are Han, aged 60 to 86 years, with average age (67.0 + 4.90); 220 are Uyghur, aged 60 to 107 years, with average age (67.97 + 7.71).

MCI risk factor analyses of Han groups

MCI univariate analysis of influencing factors

For the Han group, the difference between the two groups was statistically significant *(P* < 0.05) in age, hypertension, TG and LDL-ch. The difference in other factors such as gender, education level, marital status, BMI, abdominal circumference, abnormal glucose metabolism, drinking, smoking, TC and HDL-ch was not statistically significant *(P* > 0. 05), see **Tables 1**, **2**.

Han population MCI multivariate analysis of factors

Multi-factor Logistic regression models were applied to factors which were statistically significant in the univariate analysis of Han group. The results showed that age, hypertension, TG and LDL-ch are risk factors for MCI, (OR values were: 1.115, 1.981, 1.315, 1.495) (all *P* < 0.05), see **Table 3**.

Risk factors analysis of MCI for uyghur group

Univariate analysis of MCI influencing factors

The difference between the MCI group and control group was statistically significant *(P* < 0.05) in age, gender, hypertension, and abnormal glucose metabolism, TG, TC and LDL-ch for Uyghur group. Differences between the two groups was not statistically significant *(P* > 0. 05) for other factors such as level of education, marital status, alcohol consumption, smoking, BMI, abdominal circumference and HDL-ch as shown in **Tables 4**, **5**.

Multivariate analysis of MCI factors

Multi-factor Logistic regression models were applied to factors which were statistically significant in the univariate analysis for Uyghur

Table 4. Uyghur mild cognitive impairment univariate analysis (count data) (case, %)

Index		Case group	Control group	$\div^2$/Z	*P* values
Gender	Male	65 (44.5%)	130 (59.4%)	7.759	0.005
	Female	81 (55.5%)	89 (40.6%)		
Hypertension	Yes	91 (62.3%)	80 (36.5%)	23.415	0.00 0
	No	55 (37.7%)	139 (63.5%)		
Abnormal glucose metabolism	Yes	40 (27.4%)	23 (10.5%)	17.509	0.00 0
	No	106 (72.6%)	196 (89.5%)		
Education	Illiteracy	60 (41.1%)	79 (36.1%)	1.890	0.059
	Primary school	56 (38.4%)	71 (32.4%)		
	Junior high school	27 (18.5%)	56 (25.6%)		
	High school and above	3 (2.0%)	13 (5.9%)		
Marital status	Single	2 (1.4%)	1 (0.5%)	1.252	0.601
	Married	140 (95.9%)	214 (97.7%)		
	Divorce	0 (0%)	0 (0%)		
	Widowed	4 (2.7%)	4 (1.8%)		
Smoke	Yes	32 (21.9%)	33 (15.1%)	2.808	0.094
	No	114 (78.1%)	186 (84.9%)		
Drinking	Yes	6 (4.1%)	5 (2.3%)	1.000	0.317
	No	140 (95.9%)	214 (97.7%)		

Table 5. Uyghur mild cognitive impairment analysis (measurement data) univariate

Index	Case group ($\overline{X} \pm S$)	In the control group ($\overline{X} \pm S$)	*t*	*P* values
Age	70.89 ± 8.69	67.97 ± 7.71	-4.423	0.001
BMI	23.99 ± 4.20	24.65 ± 3.75	1.572	0.117
Abdominal circumference	84.03 ± 10.95	85.83 ± 9.36	1.677	0.094
TG (mmol/L)	2.10 ± 1.04	1.52 ± 0.79	-5.651	0.00 0
TC (mmol/L)	4.97 ± 1.30	4.33 ± 1.20	-4.828	0.00 0
HDL-ch (mmol/L)	1.27 ± 0.35	1.34 ± 0.44	1.52 0	0.13 0
LDL-ch (mmol/L)	3.25 ± 0.72	2.93 ± 0.69	-4.226	0.00 0

group. The results showed that age, hypertension, abnormal glucose metabolism, TG, TC, LDL-ch and female are MCI risk factors, (OR values were: 1.063, 2.145, 2.879, 2.078, 1.429, 1.485, 0.462) *(P* < 0.05), as shown in **Table 6**.

Discussion

There are many reports abroad about risk factors for MCI study, currently the risk factors found include age, gender, geographical differences, education, smoking, alcohol consumption, physical exercise, thyroid hormone, estrogen, dyslipidemia, hypertension, diabetes, APOEε4 genes, oxygen free radicals, psychosomatic disorders, and drugs, etc., but the relationship between these factors and the MCI has not yet confirmed. On the basis of the Xinjiang Uyghur and Han elderly MCI epidemiological investigation the analysis of the similarities and differences between Uyghur and Han ethnic influence of different factors, are discussed below:

Relationship between MCI and age

At present, many studies have shown that researches have confirmed the age is an independent factor affecting brain dysfunction. The brain tissue gradually shrinks while age increases; physiological functions will follow naturally degraded, suggesting that cognitive impairment become serious with aging. From a thousand 75 to 95-year-old non-demented subjects' research survey, Frisoni et al [3] found that MCI prevalence gradually increases with

Table 6. Uyghur MCI multivariate Logistic regression analysis

Factor	β	SE	Wald	OR (95% CI)	*P* values
Age	0.061	0.016	14.746	1.063 (1.030-1.096)	0.00 0
Gender	-0.772	0.256	9.064	0.462 (0.280-0.764)	0.003
Hypertension	0.763	0.255	8.928	2.145 (1.300-3.538)	0.003
Abnormal glucose metabolism	1.057	0.326	10.514	2.879 (1.519-5.455)	0.001
TG (mmol/L)	0.731	0.148	24.315	2.078 (1.554-2.778)	0.00 0
TC (mmol/L)	0.357	0.115	9.554	1.429 (1.139-1.791)	0.002
LDL-ch (mmol/L)	0.395	0.200	3.901	1.485 (1.003-2.198)	0.048

Note: Medical multivariate statistical analysis methods. Chen Feng, Beijing: China Statistics Press, 2000.12: 89-90.

aging. For age group 75 to 79 the prevalence of MCI was 13.8%, for age group 80 to 84 was 14.2%, and up to 20.0% for age group over 85. Our results show that for both Uyghur and Han groups, age is an independent risk factor for MCI *(P* < 0.05). With age increases, the risk of MCI increases. This is consistent with domestic and international coverage.

The relationship between blood pressure and MCI

Vascular factors have a significant effect on cognitive function in the elderly [4], of which the most important is blood pressure. Hypertension may have a broader impact on cognitive function, memory and attention functions are most easily getting damaged. Framingham [5] study reported that the average diastolic blood pressure levels and visual regeneration, recite numbers, and logical memory were negatively correlated to delayed logical memory subtest scores, this results supports that blood pressure most likely to make functional damage to the memory. Studies have shown that isolated systolic hypertension and diastolic blood pressure plays an important role in cognitive impairment [6, 7]. Our study found that high blood pressure is a risk factor for MCI in Uyghur, Han groups (Han OR: 1.981, Uyghur OR: 2.145, Both *P* < 0.05). Prompt with elevated blood pressure, the risk of MCI also increased. This is consistent with domestic and international coverage.

Now that the reason of high blood pressure causing MCI is that and long-term high blood pressure decreases vascular elasticity, atherosclerosis, stenosis, resulting in decreased cerebral blood flow and metabolism, decreased periventricular white matter perfusion and cerebral perfusion. The brain is extremely sensitive to ischemia and hypoxia, prompting white matter and neuronal damage in the hippocampus, causing cognitive dysfunction. Elevated blood pressure causes sharp spasm of cerebral arteries, leading to decreased cerebral microcirculation, increases capillary permeability, and ultimately into the extracellular fluid of brain edema formation, then broken capillaries causes spotting, micro-ischemia-induced ischemic infarction; autoregulation of cerebral function will be damaged leading to cognitive dysfunction.

MCI's relationship with lipid metabolism

Research on the relationship between lipid metabolism and MCI has become popular. Yaffe et al [8] study shows that elevated serum cholesterol may increase cognitive dysfunction and dementia risk. High cholesterol is a risk factor for MCI, the foreign [9] studies have reported that middle-aged serum cholesterol (TC ≥ 6.5 mmol/L) is a risk factor for MCI (OR: 1.9). Increase in serum cholesterol can cause damage to the brain capillary endothelial cells and arterial function, and to accelerate atherosclerosis, then reduce cerebral blood flow, leading to the impaired cognitive function of brain metabolism, so that the risk of dementia increases. There can be an increase in serum cholesterol neuronal degeneration related to cognitive dysfunction direct impact [10, 11]. ERICVAN [12] et al found that the lower the concentration of HDL, the lower the MMSE score, suggesting a positive correlation between HDL and cognitive function, the lower the HDL concentration, the worse the cognitive function, the higher incidence of dementia, based on studies to 561 elderly who are 85 years older. HDL is anti-atherosclerotic lipoproteins, thus reducing cognitive function in elderly due to decreased cerebral arteriosclerosis. Our results showed of

no significant difference in HDL between the MCI group and control group for either Han or Uyghur groups. There are also a study [13] reported that MCI patients have lipid metabolism disorders, high TC, LDL-ch, ApoB levels, but low anti-atherogenic HDL-ch level. LDL oxidation by chemical reaction can acetylated low-density lipoprotein, or acetate into acetyl LDL, low-density lipoprotein cholesterol is a major band in plasma lipoproteins, and its particles are relatively small, and can easily go through the blood vessels film, resulting vascular endothelial cell damage in the metabolic process, increasing permeability of the wall, and ester deposition of the large amount of cholesterol. LDL-c can be considered as a risk factor for mild cognitive impairment, this is consistent with the results of our study.

Our study shows that lipid disorders are risk factors for both Han and Uyghur groups. For Han group, TG, LDL-ch levels of elderly suffering from MCI were significantly higher *(TG:* OR: 1.315, $P < 0.05$; LDL-ch: *OR:* 1.495, $P < 0.05$), and for Uyghut group, TG, TC, LDL-ch levels of the elderly suffering from MCI were also significantly higher than those of non-MCI *(TG:* OR: 2.174; TC: OR: 1.401, LDL-ch: *OR:* 1.63, all $P < 0.05$). Lipids are mainly consisted of cholesterol, triglycerides, HDL cholesterol, LDL cholesterol composition. In this study, however, only in the Uyghur group cholesterol is a risk factor for MCI. High cholesterol is closely related to diet, high cholesterol food include: animal offal, brain, spinal cord, egg yolk, roe, shellfish and certain mollusks (cuttlefish, squid). Due to diet and region differences in Uyghur and Han, the cholesterol levels for Uyghur and Han groups in this study are different. Reducing the intake of dietary cholesterol and actively taking lipid-lowering drugs on plasma to adjust brain lipid, can help prevent the occurrence of MC I, thereby reduce the incidence of dementia.

The relationship between glucose and MCI

Many domestic and foreign researches confirmed that diabetes is also one of the risk factors for MCI. Diabetes causes direct damage to neurons in the brain, and has an impact on the expression of several neurotransmitter proteins, thereby undermining the structure of the brain and causing the brain dysfunction. Glycemic control is an important risk factor for MCI, chronic hyperglycemia increases free radicals and inflammatory reaction and deposition of amyloid body of the vessel wall, causing damage of cerebral vascular endothelial function and cognitive impairment functions [14].

Our study found that abnormal glucose metabolism is a risk factor for MCI in the Uyghur group (OR: 2.879, $P < 0$ 05). Along with elevated blood glucose, cognitive function gets impaired. However, there is no significant difference between MCI group and control group in Han group. We consider the differences between the two abnormal glucose metabolisms may be associated with Uyghur and Han ethnic genes, geographical differences and different diets. Therefore, early detection of abnormal glucose metabolism as well as the positive control blood sugar levels in diabetic patients can reduce the risk of MCI.

The possible mechanism of mild diabetes increasing the risk of cognitive dysfunction include: 1 diabetes will change the arterial vascular basement membrane, leading endothelial damage, vascular autoregulation disorders, reduced cerebral perfusion, hardening of the blood vessels and cardiovascular disease; 2 diabetes can cause the disorders of metabolism of lipids, glucose, affecting the brain metabolism of amino acids, glucose and lipids, causing prolonged hypoxia of brain metabolism, eventually causing cognitive dysfunction.

The relationship between gender and MCI

There are still a lot of controversy regarding the relations between gender and MCI. Foreign literature reported there was no significant gender difference in the prevalence of MCI among the elderly. There are also reports [15] indicating MCI prevalence of women is higher than men. For Domestic studies, Meng Chen et al [16] found that cognitive dysfunction is higher in women than men, the difference was statistically significant. It has been reported [17] that for a 488 rural elderly cognitive function study women's Mini-Mental State Examination (MMSE) total scores were significantly less than men; women are risk factors for MCI. The study found that the risk of Uyghur women suffer from MCI is higher than men (OR: 0.462, $P < 0.05$). Therefore, the relationship between gender and cognitive impairment is still controversial.

MCI prevalence of women may be due to estrogen levels. Abroad has been reported [18] that lower estrogen levels and cognitive dysfunction are related. Estrogen can increase blood supply to the brain cortex, hippocampus neurons to promote glucose metabolism and extraction, and can reduce neuronal damage, thereby improving cognitive function. WHIMS from JAMA showed that estrogen plus progestin hormone replacement therapy, will increase the risk of dementia in postmenopausal women 65 years to double. Drake et al [19] reported that androgens can enhance certain cognitive functions. There is no significant gender differences between MCI group and control group for Han group, the factor affecting Uyghur women include lifestyle, geographical differences and so on.

The relationship between lifestyle and MCI

Smoking

There are few studies on the relationship between smoking and MCI. Meyer et al [20] showed that cognitive dysfunction accounted for 75.6% in smokers, while only 52.5% in control group, suggesting that smoking is a risk factor for MCI. Epidemiological data show that for people who smoke with the moderate amount or heavy amount (25 cigarettes/day), regardless of age, as long as they can quit smoking for 2-4 years, the risk of stroke decreases. Smoking is an important factor leading to thickening of arterial plaque, increasing plasma viscosity and fibrinogen levels, platelet aggregation and increasing blood pressure, which impairs cognitive function. During smoking carbon monoxide fumes, as well as tobacco nicotine, tar and other harmful substances are produced; it will cause vascular endothelial damage, myosin contraction, and increase vascular permeability to accelerate atherosclerosis extent, increase the risk of stroke, and damage the cognitive function. However, there is no significant difference in smoking between the MCI group and the control group in this study ($P < 0.05$).

Drinking

Currently there is no uniform opinion on the relationship between drinking and MCI. Moderate alcohol consumption may have a protective effect on cognitive function. Anttila reported that [21] through a 23 years follow-up study on thousands of 65-79 year-elderly, non-drinker and heavy drinkers have a greater risk to MCI compared to mild drinker. Overseas studies have been reported that excessive alcohol consumption might cause cognitive function, but men drinking less than 80 g/day, women drinking less than 40 g/day, can reduce the prevalence of the risk of MCI.

Our study found that there is no correlation between drinking and MCI in either Uyghur or Han groups, consider the religion factor that controls alcohol and smoking for Uyghur group in this epidemiological survey, it may cause relative impact on the questionnaire and the results. There may some interaction between drinking and smoking but the available literature does not make clear the definition of smoking and drinking, such as smoking and drinking frequency, types and so on. Therefore, the impact on cognitive function needs further investigation.

The link between education and the MCI

Studies have shown that education level may affect the occurrence and development of MCI. Overseas studies have shown [22] that people with lower level of education were more likely to develop MCI, on the contrary the higher the education level, the lower the risk of MCI. Possible reasons may include: high level of education can make changes to the brain metabolism, brain structure and the degree of biological neural synaptic connections, so the brain can tolerate functional or structural defects in the brain cells to a certain amount and extent. Instead, for people with lower levels of education, there is lack of knowledge to stimulate the brain, causing massive loss of neurons, and more easily get cognitive function damaged. Other possible reason is the health, poverty and socio-economic status with lower level education background. Our study does not show significant differences between cases and controls for different education levels. The reason for this result may be caused by the inconsistencies of tools and groups. Therefore, the correlation between the two remains to be further studied.

The relationship between marital status and MCI

There are few studies on the relationship between marital status and MCI. Domestic

Investigation found that rural elderly who are widowed, separated and divorced intend to have a higher chance of damaged cognitive function, as the elderly emotion insufficiency can accelerate aging. A study [23], which is based on the Uyghur elderly population between 60-85 years old, found that divorced or widowed may be one of the risk factors for MCI. This shows divorced widowed elderly are more susceptible to MCI. One of the psychological characteristics of the elderly is that with age increasing, the focus of the spiritual life gradually shifted from reality to the inner spiritual activities, emotional care for the elderly is an important requirement for the spiritual life. Bedridden spouse or loss of a spouse are major mental stimulations and will bring psychological reactions to varying degrees, the elderly will gradually recover after numb, thoughts, depression and recovery in four phases. Widowed have some living problems, such as elderly men often do not do housework, after his wife's death, his life will encounter great difficulties. Too few social exchanges with the outside world will also prone to loneliness. Our study found no correlation between marital status and MCI, the inconsistency may be caused by the difference of study subjects.

Relations between BMI, abdominal circumference and MCI

Currently there are no relevant studies on correlation between body mass index, waist and MCI. Kivipelto [24) et al did a 21 year follow up study on more than a thousand 65-79 year olds and found that middle-aged obesity (BMI ≥ 30 kg/m^2) may increase the risk of dementia (OR = 2.4). Another study [25] found that BMI is an important risk factor for cognitive impairment. The study did not draw the relationship between BMI, abdominal circumference and MCI, the relationship between them needs further study.

In summary, there are common risk factors for MCI in the Xinjiang Uyghur and Han ethnic elderly groups, such as age, hypertension, hyperlipidemia; as well as different factors, such as abnormal glucose metabolism and gender. It is recommended that actively control blood pressure, prevent dyslipidemia for patients with cognitive impairment from various ethnic minority areas in the west. Preventive and treatment measures should be given based on the difference of ethnicity to delay MCI occurrence, reduce the incidence of dementia, and ultimately improve the quality of life of older people.

Acknowledgements

This work was supported by the National Natural Science Fund Project: Study on epidemiology and community intervention of mild cognitive impairment in Xinjiang Uygur, Han and two minority of elderly people (30960402).

Disclosure of conflict of interest

None.

Address correspondence to: Xiao-Hui Zhou, The First Department of Cadre, First Affiliated Hospital of Xinjiang Medical University, Urumqi 830054, China. Tel: +86- 0991-3823221; Fax: +86- 0991-3823221; E-mail: zhxhui668@163.com

References

[1] Barker A, Jones R and Jennison C. A prevalence study of age associated memory impairment. Br J Psychiatry 1995; 167: 642-648.

[2] Zhu XQ, Zhou XH, Kumusi B, Yue YH, Zhao RJ, Xing SF, Kabinuer K and Ailikemu A. The investigation of the mild cognitive dysfunction in the Xinjiang Uyghur and Han ethnic elderly. Chinese Journal of Geriatric Medicine 2009; 28: 865-869.

[3] Frisoni GB, Fratiglioni L, Fastbom J, Guo Z, Viitanen M and Winblad B. Mild cognitive impairment in the population and physical health:data on l435 individuals aged 75 to 95. J Gerontol A Biol Sci Med Sci 2000; 55: 322-328.

[4] Xie HG, Wang XH, Ma TX, Wang ZF and Wang LN. Injuries and risk factors survey for 75 years of age or older with mild cognitive status of. Chinese Journal of Geriatric Heart Journal of Cerebrovascular Diseases 2003; 5: 318-321.

[5] Elias MF, Wolf PA, D'Agostino RB, Cobb J and White LR. Untreated blood pressure level is inversely related to cognitive functioning:the Framinghamstudy. Am J Epidemiol 1993; 138: 353-364.

[6] Hrrington F, Saxby BK, Mckeith IG, Wesnes K and Ford GA. Cognitive performance in hypertensive and normotensive older subjects. Hypertension 2000; 36: 1079.

[7] Starr JM, Whalley LJ, Inch S and Shering PA. Blood pressure and cognitive functioning in healthy old people. J Am Geriatr Soc 1993; 41: 753-756.

[8] Yaffe K, Barnes D, Lindquist K, Cauley J, Simonsick EM, Penninx B, Satterfield S, Harris T and Cummings SR. Endogenous sex hormone levels and risk of cognitive decline in a biracial older cohort:Findings from the Health Cognitive Vitality Study. Neurobiol Aging 2007; 28: 171-178.
[9] Kivipelto M, Helkala EL, Hänninen T, Laakso MP, Hallikainen M, Alhainen K, Soininen H, Tuomilehto J and Nissinen A. Midlife vascular risk factors and late-life Mild cognitive impairment: Apopulation-based study. Neuorlogy 2001; 56: 1683-1689.
[10] Skoogl, Kalaria RN and Breteler MM. Vascular factors and Alzheimer dsiease. A Izheimer Dis Assoc Dieord 1999; 13: 106-114.
[11] Carmelli D, Swan GE, Reed T, Wolf PA, Miller BL and DeCarli C. Midlife cardiovascular risk factors and brain Morphology in identical older male twins. Neurology 1999; 52: 1119-1124.
[12] van Exel E, de Craen AJ, Gussekloo J, Houx P, Bootsma-van der Wiel A, Macfarlane PW, Blauw GJ and Westendorp RG. Association between high-density lipoprotein and cognitive impairment in the oldest old. Ann Neurol 2002; 51: 716-721.
[13] Shang FR and Zhang JJ. The Relationship of Serum Lipid and Mild Cognitire Impairment. J N Med 2005; 15: 20-22.
[14] Gregg E and Brown A. Cognitive and Physical Disabilities and Aging -Related Complications of Diabetes. Clinical Diabetes 2003; 21: 113-118.
[15] Ganguli M, Dodge HH, Shen C, DeKosky ST. Mild cognitive impairment, amnestictype: an ep idemiologic study. Neurology 2004; 63: 15-21.
[16] Meng C and Tang Z. Five-year prospective study of functional prognosis of elderly in community awareness. J Neurosci 2000; 33: 138.
[17] Huo DH, Wang XJ, Zhang F and Men BY. Cognitive function and influencing factors analysis for Shaanxi Zhouzhi 488 elderly. Chinese Chronic Disease Prevention and Control 2000; 8: 142.
[18] Manly JJ, Merchant CA, Jacobs DM, Small SA, Bell K, Ferin M and Mayeux R. Endogenous estrogen levels and Alzheimer's disease among postmenopausal women. Neurology 2000; 54: 833-837.
[19] Drake EB, Henderson VW, Stanczyk FZ, McCleary CA, Brown WS, Smith CA, Rizzo AA, Murdock GA and Buckwalter JG. Associations between circulation sex steroid hormones and cognition in normal elderly women. Neurology 2000; 54: 599-603.
[20] Meyer JS, Rauch G, Rauch RA and Haque A. Risk factors for cerebral hypoperfusion, mild cognitive impairment, and dementia. Neumbiol Aging 2000; 21: 161-169.
[21] Anttila T, Helkala EL, Viitanen M, Kåreholt I, Fratiglioni L, Winblad B, Soininen H, Tuomilehto J, Nissinen A and Kivipelto M. Alcohol drinking in middle age and subsequent risk of mild cognitive impairment and dementia in old age:aprospective population based study. Br Med J 2004; 329: 539-544.
[22] Tervo S, Kivipelto M, Hänninen T, Vanhanen M, Hallikainen M, Mannermaa A and Soininen H. Incidence and risk factors for mild cognitive impairment:a population-based three-year follow-up study of cognitively healthy elderly subjects. Dement Geriatr Cogn Disord 2004; 17: 196-203.
[23] Bahaguli AS and Feng L. The marriage and cultural study on Uyghur elderly with mild cognitive impairment and normal elderly. Xinjiang Medicine 2008; 38: 77-79.
[24] Kivipelto M, Ngandu T, Fratiglioni L, Viitanen M, Kåreholt I, Winblad B, Helkala EL, Tuomilehto J, Soininen H and Nissinen A. Obesity and vascular risk factors at midlife and risk of dementia and Alzheimer disease. Arch Neurol 2005; 62: 1556-1560.
[25] Cournot M, Marquié JC, Ansiau D, Martinaud C, Fonds H, Ferrières J and Ruidavets JB. Relation between body mass inde-x and ognitive function in healthy middle-aged men and women. Neurology 2006; 67: 1280-1214.