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Analysis of Risk Factors for Cognitive Dysfunction in Disabled Elderly Patients in Chengdu, China

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Background: With the aging population comes an increase in functional disability that leads to dependency and institutionalization, as well as social, medical, and economic challenges. This study aimed to classify and assess the factors affecting cognitive deficits in disabled elderly people.

Material/Methods: Disabled patients ≥60 years old were assessed by face-to-face cross-sectional surveys, which were conducted using advanced peer-to-peer software. The ability to perform daily life tasks was assessed using the Modified Barthel Index. Cognitive function was evaluated with the Mini-cognitive assessment instrument. Using these surveys, 9471 individuals were included in this study. The rank-sum test was used to investigate differences between groups. Disordered multi-class logistic regression was used to correct related confounding factors for multivariate analysis.

Results: The ratios of normal cognitive function, cognitive impairment, and dementia were 3.71%, 38.59%, and 57.70%, respectively. The univariate analysis and multivariate analysis showed that older individuals (≥80 years), women, illiterate individuals, and lonely persons were more prone to dementia. Moreover, a history of hypertension, diabetes, osteoporosis, and fractures were significantly associated with dementia.

Conclusions: The proportion of dementia in the elderly disabled patients is very high (57.7%) in Chengdu City. Age (≥80 years), female sex, education level (illiterate individuals), living conditions, and chronic disease were closely correlated with cognitive functions.

MeSH Keywords: **Aging • Chronic Disease • Cognition • Disabled Persons**

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Background

China is an aging society in which elderly individuals constituted 11% of the total population in 2017 [1]. With population aging comes an increase in functional disability that leads to dependency, institutionalization, and social, medical, and economic concerns [1–3]. An estimated 33 million Chinese individuals over the age of 60 years have mental or physical disabilities, and almost one-third are dependent on others for assistance [3]. The importance of mental health disorders is highlighted by the WHO "mental health action plan 2013–2020", which stressed the importance of promoting mental health and well-being to prevent mental disorders [4]. The major mental disability is dementia, defined as a decline in mental ability that affects memory, thinking, concentration, and perception [5]. Dementia is the result of neuronal cell death in brain areas that control thought processes. According to recent Alzheimer's disease (AD) international reports, approximately 44.4 million people were living with dementia in China in 2013 and this number is estimated to reach 75.6 million by 2030 [6], and the costs associated with mental disorders are increasing steadily [1,7]. Given the rapid growth in the elderly population in China, mental health-care costs will pose a challenge to Chinese healthcare systems and the Chinese economy.

For many years, it has been known that mental health disorders are more prevalent in people with physical and learning disabilities, but research in this area remains sparse [2,5,8–11]. Cognitive impairment leads to a loss of independence in daily activities, which accelerates institutionalization, disability, and illness [3,12,13]. Despite this increased prevalence, data regarding cognitive dysfunction in the elderly disabled population in China remains limited. The aim of this study was to investigate the levels of cognitive dysfunction in the Chinese population and discover related factors in disabled elderly individuals through population-based cross-sectional surveys of elderly individuals living in Chengdu, China.

Material and Methods

Study design

Face-to-face cross-sectional surveys were conducted using advanced peer-to-peer (APP) software. The ability to perform daily life tasks was assessed using the Modified Barthel Index [14]. Cognitive function was evaluated with the Mini-cognitive assessment instrument (Mini-cog) [15]. We collected data on common diseases and living conditions. Assessments were performed using a centralized approach to homes, the community, and hospitals.

This study was approved by the Biomedical Ethics Committee of West China Hospital, Sichuan University (approval No. 2017 Trial (303)).

Participants

Inclusion criteria were individuals over age of 60 years who had been disabled for at least 6 months. Exclusion criteria included psychiatric patients, individuals admitted to hospital due to acute illness during the assessment period, and refusal to undergo an assessment. The assessment team consisted of 1070 assessors that included rehabilitation doctors and clinicians. The assessors participated in a training course for senior comprehensive assessment at the National Clinical Research Center of Geriatrics. After the training course, doctors and clinicians were tested via theoretical examination and practical assessment. For the trainees who are qualified in theory and practice, the Chinese Medical Association and National Clinical Research Center of Geriatrics would issue the elderly comprehensive evaluation certificate. The above examination and comprehensive evaluation certificate guarantee the reliability of data.

Written informed consent was obtained from all subjects, and human data included in this article were obtained in compliance with the Helsinki Declaration.

Mini-cog test

In this study, the cognition of patients was evaluated using the Mini-cog test as described in a previous study [16]. The Mini-cog test mainly includes a 3-word recall task for evaluating memory and clock drawing test for assessing the cognitions (language, cognitive functions, visual/motor capability, and executive functions). The standard Mini-cog scoring system involves the score from 0 to 3 points for word recall task representing correct recall for 0 words, 1 word, 2 words, and 3 words, respectively. The clock drawing test results were scored as "abnormal" or "normal". In the Mini-cog scoring system, 0 points combining abnormal clock drawing test represents dementia, 3 points represents no cognitive impairment, and 1 point or 2 points represents cognitive impairment (if also with abnormal clock drawing test) or no cognitive impairment (if with normal clock drawing test).

Data analysis

Data were analyzed using IBM SPSS (Version 21.0, SPSS, Inc., Chicago, IL, USA). The rank-sum test was used to investigate differences between groups. Disordered multi-class logistic regression was used to correct the related confounding factors for multivariate analysis. A $p<0.05$ was deemed statistically significant.

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Table 1. Univariate analysis of general characteristics and cognitive function.

General characteristics	Normal cognitive function	Cognitive impairment	Dementia	Total number	Z-statistic	*P*-value
Current age						
60–79 years	258 (73.30%)	1877 (51.37%)	1988 (36.38%)	4123 (43.53%)	−17.439	<0.01
≥80 years	94 (26.70%)	1777 (48.63%)	3477 (63.62%)	5348 (56.47%)		
Sex						
Female	117 (33.24%)	1939 (53.07%)	3412 (62.43%)	5468 (57.73%)	−11.801	<0.01
Male	235 (66.76%)	1715 (46.93%)	2053 (37.57%)	4003 (42.27%)		
Education level						
Educated	340 (96.59%)	2892 (79.15%)	4110 (75.21%)	7342 (77.52%)	−7.392	<0.01
Illiterate	12 (3.41%)	762 (20.85%)	1355 (24.79%)	2129 (22.48%)		
Income						
Pension	339 (96.31%)	3524 (96.44%)	5268 (96.40%)	9131 (96.41%)	−0.069	0.945
Other	13 (3.69%)	130 (3.56%)	197 (3.60%)	340 (3.59%)		
Marital status						
Other	97 (27.56%)	1511 (41.35%)	2768 (50.65%)	4376 (46.20%)	−10.783	<0.01
Married	255 (72.44%)	2143 (58.65%)	2697 (49.35%)	5095 (53.80%)		
Living situation						
Not live with family	82 (23.30%)	1087 (29.75%)	2520 (46.11%)	3689 (38.95%)	−16.857	<0.01
Other	270 (76.70%)	2567 (70.25%)	2945 (53.89%)	5782 (61.05%)		
Combined disease						
<5	168 (47.73%)	1534 (41.98%)	2450 (44.83%)	4152 (43.84%)	−1.921	0.055
≥5	184 (52.27%)	2120 (58.02%)	3015 (55.17%)	5319 (56.16%)		
Disability level						
Mild	55 (15.63%)	209 (5.72%)	84 (1.54%)	348 (3.67%)	772.529	<0.01
Moderate	112 (31.82%)	752 (20.58%)	342 (6.26%)	1206 (12.73%)		
Severe	185 (52.5%)	2693 (73.70%)	5039 (92.20%)	7917 (83.59%)		

Results

Univariate analysis of general characteristics and cognitive function

A total of 9471 disabled individuals were included, with a mean age of 80.1±8.8 years, consisting of 57.7% females and 42.3% males. The ratios of normal cognitive function, dementia-cognitive impairment, and dementia were 3.7%, 38.6%, and 57.7%, respectively. General characteristics of the patient population are shown in Table 1.

Multivariate analysis of general characteristics and cognitive function

An ordered logistic regression analysis produced a parallel line test of P<0.01, which fails to satisfy the "proportional advantage" hypothesis of ordered logistic regression analysis. Therefore, we used disordered multi-class logistic regression. We explored the correlation between age, sex, education level, living conditions, marital status, other diseases, disability, and cognitive function.

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Table 2. Multivariate analysis of general characteristics and cognitive function.

General characteristics	Dementia – Normal cognitive function			Dementia – Cognitive impairment		
	Wald	P	OR (95%CI)	Wald	P	OR (95%CI)
60–79 years	77.355	<0.01	3.254 (2.502, 4.233)	101.294	<0.01	1.638 (1.488, 1.803)
Female	46.332	<0.01	0.420 (0.328, 0.539)	32.903	<0.01	0.754 (0.684, 0.830)
Married	0.041	0.840	1.029 (0.777, 1.364)	0.085	0.770	1.015 (0.917, 1.125)
Illiterate	35.499	<0.01	6.105 (3.367, 11.070)	2.351	0.125	1.093 (0.976, 1.225)
Pension	0.100	0.752	1.102 (0.604, 2.010)	0.252	0.616	1.063 (0.838, 1.347)
Not live with family	16.633	<0.01	0.563 (0.427, 0.742)	108.806	<0.01	0.602 (0.547, 0.662)
<5 combined diseases	0.011	0.918	0.988 (0.787, 1.241)	12.636	<0.01	0.850 (0.777, 0.930)
Mild disability	219.924	<0.01	19.10 (12.938, 28.21)	126.420	<0.01	4.490 (3.456, 5.833)
Moderate disability	232.518	<0.01	8.089 (6.183, 10.582)	348.538	<0.01	3.760 (3.272, 4.321)

Older individuals were more prone to dementia (dementia-normal cognitive function χ^2=77.355, P<0.01, dementia-cognitive impairment χ^2=101.294, P<0.01). Disabled females were more prone to dementia than males (dementia-normal cognitive function χ^2=46.332, P<0.01, dementia-cognitive impairment χ^2=32.903, P<0.01). Those with low education level were more likely to develop dementia than those with higher education (dementia-normal cognitive function χ^2=35.499, P<0.01). Those not living with their family were more prone to dementia (dementia-normal cognitive function χ^2=16.633, P<0.01, dementia-cognitive impairment χ^2=108.806, P<0.01). The specific analysis is shown in Table 2.

Univariate analysis of common diseases and cognitive functions

The top 8 diseases were hypertension, stroke sequelae, osteoporosis, constipation, diabetes, coronary heart disease, fracture, and hyperlipidemia. The proportion of patients with disability and dementia with 2 or more comorbidities was 93.9%. Univariate analysis showed a significant association of hypertension, diabetes, hyperlipidemia, constipation, fracture, and osteoporosis with cognitive functions (Table 3).

Multivariate analysis of common diseases and cognitive functions

After correcting for age, sex, economic sources, living conditions, marital status, and disability levels, the influence of other diseases was assessed using a unified model for ordered logistic regression analysis, but the parallel line test showed a P<0.01. We therefore used a disordered multi-class logistical regression analysis to explore the effects of disease on cognitive function.

Hypertensive patients were more prone to dementia than non-hypertensive patients (dementia-normal cognitive function χ^2=4.643, P=0.031, dementia-cognitive impairment χ^2=12.677, P<0.01). Elderly disabled individuals with fractures were more likely to develop dementia than non-fracture patients (χ^2=17.594, P<0.01). Disabled elderly patients with osteoporosis were more prone to dementia (χ^2=25.889, P<0.01). Those with diabetes were also more likely to develop dementia (χ^2=5.573, P=0.018) (Table 4).

Discussion

In this study 57.70% of the disabled elderly assessed had dementia, which is higher than statistics from the general elderly populations of China, Europe, and America [17–19]. Dementia therefore affects a significant proportion of the disabled elderly. Our findings are in agreement with international studies identifying that older age is associated with dementia [17,19–26]. Females have prevalence rates of dementia than males [27,28], which might be attributable to the different hormone levels and the lifestyle-specific differences of between males and females [28]. It is important to understand the association of sex and hormones (such as estrogen levels, although the female patients are postmenopausal) with dementia. Elderly with low education level are more likely to develop dementia than those with higher education [29]. The prevalence of dementia fell by 7% per year of increased education. Individuals with higher education tended to have better cognitive abilities, which may compensate for dementia-related brain pathology [29–32].

In this study, we applied the Mini-cog test [16], a 3-minute test, to evaluate cognition. The Mini-cog test is usually only slightly

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Table 3. Univariate analysis of common diseases and cognitive functions.

Diseases	Normal cognitive function	Cognitive impairment	Dementia	Total number	Z-statistic	*P*-value
Hypertension						
No	124 (35.23%)	1391 (38.07%)	2376 (43.48%)	3891 (41.08%)	−5.623	<0.01
Yes	228 (64.77%)	2263 (61.93%)	3089 (56.52%)	5580 (58.92%)		
Coronary heart disease						
No	270 (76.70%)	2601 (71.18%)	3888 (71.14%)	6759(71.37%)	−0.891	0.373
Yes	82 (23.30%)	1053 (28.82%)	1577 (28.86%)	2712(28.63%)		
Diabetes						
No	244 (69.32%)	2517 (68.88%)	3969 (72.63%)	6730 (71.06%)	−3.852	<0.01
Yes	108 (30.68%)	1137 (31.12%)	1496 (27.37%)	2741 (28.94%)		
Hyperglycemia						
No	249 (70.74%)	2712 (74.22%)	4239 (77.57%)	7200 (76.02%)	−4.290	<0.01
Yes	103 (29.26%)	942 (25.78%)	1226 (22.43%)	2271 (23.98%)		
Stroke sequelae						
No	223 (63.35%)	2233 (61.11%)	3440 (62.95%)	5896 (62.25%)	−1.476	0.14
Yes	129 (36.65%)	1421(38.89%)	2025 (37.05%)	3575 (37.75%)		
Constipation						
No	216 (61.36%)	2342 (64.09%)	3686 (67.45%)	6244 (65.93%)	−3.761	<0.01
Yes	136 (38.64%)	1312 (35.91%)	1779 (32.55%)	3227 (34.07%)		
Fracture						
No	280 (79.55%)	2713 (74.25%)	4159 (76.10%)	7152 (75.51%)	−1.191	0.234
Yes	72 (20.45%)	941 (25.75%)	1306 (23.90%)	2319 (24.49%)		
Osteoporosis						
No	234 (66.48%)	2255 (61.71%)	3604 (65.95%)	6093 (64.33%)	−3.505	<0.01
Yes	118 (33.52%)	1399 (38.29%)	1861 (34.05%)	3378 (35.67%)		

affected by education level and the language ability and is easily used by outpatient physicians and patients. Importantly, the specificity and sensitivity of screening patients with dementia, cognitive impairment, and normal cognition are higher compared to the MMSE [16,33,34]. Therefore, based on our clinical practice and the published studies cited above, we believed that the 3-min-Mini-cog test can discriminate between cognitively healthy people, cognitively impaired people, and people with dementia.

We found that those not living with family members were more prone to dementia. These patients may lack day-to-day care, have reduced interaction and communication with others, are unable to leave the home, and thus have lower mood levels and an increased risk of depression, which is a major risk factor for dementia [35–38]. It should be noted that when elderly patients develop more severe cognitive dysfunction, families frequently send patients to nursing homes due to a lack of professional care, skills, and time. Thus, those in nursing homes may have developed serious cognitive dysfunction at home. As this study was cross-sectional, we cannot confirm that those living at home with their families have a reduced dementia risk. However, we emphasize the value of family members as care-providers, which represents an important public point of care planning for elderly individuals in China.

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Table 4. Multivariate analysis of common diseases and cognitive functions.

Diseases	Dementia – Normal cognitive function			Dementia – Cognitive impairment		
	Wald	*P*	OR (95%CI)	Wald	*P*	OR (95%CI)
Hypertension	4.643	0.031	0.759 (0.590, 0.975)	12.677	<0.01	0.840 (0.763, 0.925)
Diabetes	0.165	0.685	0.948 (0.732, 1.227)	5.573	0.018	0.885 (0.799, 0.979)
Coronary heart disease	0.827	0.363	1.137 (0.862, 1.500)	0.680	0.410	0.958 (0.865, 1.061)
Osteoporosis	3.300	0.069	0.786 (0.606, 1.019)	25.889	<0.01	0.772 (0.699, 0.853)
Stroke sequelae	4.640	0.031	1.306 (1.024, 1.666)	0.374	0.541	1.030 (0.937, 1.132)
Hyperglycemia	0.001	0.970	1.005 (0.766, 1.319)	0.764	0.382	1.051 (0.940, 1.174)
Fracture	2.986	0.084	0.773 (0.577, 1.035)	17.594	<0.01	0.793 (0.712, 0.884)
Constipation	2.283	0.131	0.828, 0.648, 1.058)	0.311	0.577	0.973 (0.883, 1.072)

In agreement with previous studies, we found that chronic diseases (e.g., diabetes, hypertension, and obesity) were risk factors for dementia [27,39–42]. Hypertension induces cerebral arterial stiffening and micro-vascular dysfunction, contributing to dementia pathophysiology. Although many of the individuals in this study were disabled, we identified hypertension and diabetes as risk factors for dementia. Addressing treatment of chronic diseases, particularly those related to vascular risks, is an important issue for dementia prevention.

We found that elderly disabled patients with a history of fractures were more likely to develop dementia. Previous studies performed in Taiwan showed that the overall incidence rates of dementia in individuals with fractures were 41% higher than in those without fractures (6.05 *vs.* 4.30 per 1000 person-years) [43]. It is predicted that disabled elderly patients with fractures have reduced mobility, lower levels of physical exercise, loss of social engagement, reduced emotional communication, and less brain activity, which can lead to a reduced interest in activities, reduced emotional state, and lower cognitive function. Conversely, dementia is a known risk factor for falls and hip fractures [44–46]. Earlier studies estimated that elderly individuals with dementia experience hip fractures approximately 3 times more frequently than patients without dementia [46]. Others have shown that dementia patients constitute a significant proportion of the total elderly population with hip fractures (up to 29%) [47]. This makes it difficult to distinguish the cause-and-effect relationship between fractures and dementia.

We found that osteoporosis was associated with dementia in disabled elderly patients, a finding consistent with previous studies. Chang et al. [48] found that osteoporosis patients exhibit a 1.46-fold and 1.39-fold higher risk of dementia and Alzheimer's disease, respectively, compared to matched non-osteoporosis patients. Osteoporosis patients receiving bisphosphonate treatment or estrogen supplementation had a significantly lower risk of dementia compared to osteoporosis patients without such treatment [49].

We found that 57.7% of elderly disabled individuals in Chengdu had dementia. Multiple factors, including age, sex, education level, living conditions, a history of fractures, and chronic diseases (e.g., diabetes, hypertension, and osteoporosis) were associated with cognitive dysfunction. A comprehensive understanding of these pathways and their relative effects on the outcomes of dementia may provide a basis for development of new interventions. However, many challenges in this area remain, primarily due to the poor awareness of dementia among the Chinese public. Many people mistake cognitive dysfunction in dementia as a normal process of aging and fail to pay attention to elderly people with dementia. Even when cognitive decline leads to serious consequences, many families remain unwilling to allow relatives with dementia to receive hospital care due to lack of belief in the benefits of dementia medical care. Discrimination and stigmatization of dementia also remain, particularly in the elderly with low education levels. In addition, the knowledge regarding dementia among medical professionals and caregivers has remained low, primarily because education regarding dementia is not included as part of the regular Chinese medical curriculum. Dementia service systems also remain under-developed and have relied too heavily on home-based care. The high cost of dementia care and the significant economic burden on those with dementia and their families in China also presents problems.

Therefore, it is clear that although China has the largest number of people with dementia worldwide, an effective system to cope with its challenges is lacking. Promoting public awareness and understanding of dementia, increased training of health

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professionals, and promoting social awareness through mental health education in hospitals is required. China has begun to address these issues with the recent five-year plan for mental health that prioritizes dementia care. In Chengdu, our data on dementia risk factors in disabled elderly patients can inform policies and promote precise and personalized dementia management strategies that prioritize women, those with low educational levels, and those with previous injuries. For example, by enhancing the general educational standards in the Chinese population, we can produce individuals with higher educational backgrounds and thus a 7% reduction in their likelihood of developing dementia in later life.

The strengths of this study include the use of population-based data that are highly representative of the general population. However, the evidence derived from cross-sectional studies is generally low in statistical quality compared to that from prospective cohort studies. In addition, we cannot exclude the possibility of a bidirectional relationship between dementia and disability, due to the long pre-clinical phase of dementia development. Due to the non-specific testing for dementia with the 3-min Mini-cog test, the rate of patients with dementia was higher, which is a limitation of this study. In subsequent research, we will use more specific tests for evaluating dementia. Although there are many types of dementia in the aging population, the present study did not differentiate them, and future research should explore specific types of dementia.

Conclusions

We demonstrated that the prevalence of dementia in elderly disabled patients is very high (57.7%) in Chengdu. Age (≥80 years), female sex, education level (illiterate individuals), living conditions, and chronic disease were closely correlated to cognitive functions. It is therefore clear that the specific management of disabled dementia patients should differ from that of non-disabled patients. To establish the success of personalized dementia therapies, further studies, including prospective longitudinal studies and randomized controlled case-control trials, are required for specific populations. Success in this area may revolutionize personalized dementia care, improving patient outcomes and reducing economic costs. The Chinese government has launched a long-term care insurance program to help these disabled elderly people. Our findings suggest this program should pay more attention to dementia in disabled elderly individuals.

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Conflict of interests

None.

References:

1. Wong YC, Leung J: Long-term care in China: Issues and prospects. J Gerontol Soc Work, 2012; 55: 570–86
2. Yang F, Lin L, Jiang X et al: Increasing diverticulosis in an aging population: A colonoscopy-based study of 5-year treads in 26463 patients in Northern China. Med Sci Monit, 2018; 24: 2825-31
3. Wei M, Li J, Wang H: Impact of the disability trajectory on the mortality risk of older adults in China. Arch Gerontol Geriatr, 2017; 74: 174–83
4. 52 WHO member countries adopt mental health declaration an action plan for Europe. Psychiatr Serv, 2005; 56: 228–29
5. Kurz X, Scuvee-Moreau J, Rive B et al: A new approach to the qualitative evaluation of functional disability in dementia. Int J Geriatr Psychiatry, 2003; 18: 1050–55
6. Xu J, Wang J, Wimo A et al: The economic burden of mental disorders in China, 2005–2013: Implications for health policy. BMC Psychiatry, 2016; 16: 137
7. Yu X, Chen S, Chen X et al: Clinical management and associated costs for moderate and severe Alzheimer's disease in urban China: A Delphi panel study. Transl Neurodegener, 2015; 4: 15
8. Bahia VS, Cartherygoulart MT, Novelli MM et al: Functional disability in Alzheimer disease: a validation study of the Brazilian version of the Disability Assessment for Dementia (DAD-Br). Alzheimer Dis Assoc Disord, 2010; 24: 291–95
9. Bekic S, Babic F, Filipcic I et al: Clustering of mental and physical comorbidity and the risk of frailty in patients aged 60 years or more in primary care. Med Sc Monit, 2019; 25: 6820–35
10. Liang Y, Xu X, Yin M et al: A more comprehensive investigation of disability and associated factors among older adults receiving home-based care in rural Dongguan, China. BMC Geriatrics, 2018; 18: 158
11. Mok CC, Siu AM, Chan WC et al: Functional disabilities profile of Chinese elderly people with Alzheimer's disease, a validation study on the Chinese version of the disability assessment for dementia. Dement Geriatr Cogn Disord, 2005; 20: 112–19
12. Murray CJ, Vos T, Lozano R et al: Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet, 2012; 380: 2197–223
13. Tozlu M, Cankurtaran M, Yavuz BB et al: Functional disability in Alzheimer disease a validation study of the Turkish version of the disability assessment for dementia scale. J Geriatr Psychiatry Neurol, 2014; 27: 237–46
14. Shah S, Vanclay F, Cooper B et al: Improving the sensitivity of the Barthel Index for stroke rehabilitation. J Clin Epidemiol, 1989; 42: 703–9
15. Fage B, Chan CC, Gill SS et al: Mini-Cog for the diagnosis of Alzheimer's disease dementia and other dementias within a community setting. Cochrane Database Syst Rev, 2015; 2: CD011415
16. Borson S, Scanlan J, Brush M et al: The Mini-cog: A cognitive 'vital signs' measure for dementia screening in multi-lingual elderly. Int J Geriatr Psychiatry, 2000; 25: 1021–27
17. Borenstein AR, Copenhaver CI, Mortimer JA: Early-life risk factors for Alzheimer disease. Alzheimer Dis Assoc Disord, 2006; 20: 63
18. Zhang ZX, Zahner GE, Roman GC et al: Socio-demographic variation of dementia subtypes in China: Methodology and results of a prevalence study in Beijing, Chengdu, Shanghai, and Xian. Neuroepidemiology, 2006; 27: 177–87
19. Hebert LE, Bienias JL, Aggarwal NT et al: Change in risk of Alzheimer disease over time. Neurology, 2010; 75: 786–91
20. Detweiler MB, Kim KY, Taylor BY: Focused supervision of high-risk fall dementia patients: A simple method to reduce fall incidence and severity. Am J Alzheimers Dis Other Demen, 2005; 20: 97

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21. Fratiglioni L, Viitanen M, Strauss EV et al: Very old women at highest risk of dementia and Alzheimer's disease incidence data from the Kungsholmen Project, Stockholm. Neurology, 1997; 48: 132
22. Fujishima M, Kiyohara Y: Incidence and risk factors of dementia in a defined elderly Japanese population. Ann New York Acad Sci, 2002; 977: 1–8
23. Hobson P, Meara J: Risk and incidence of dementia in a cohort of older subjects with Parkinson's disease in the United Kingdom. Mov Disord, 2004; 19: 1043–49
24. Keage HAD, Matthews FE, Yip A et al: APOE and ACE polymorphisms and dementia risk in the older population over prolonged follow-up: 10 years of incidence in the MRC CFA Study. Age Ageing, 2010; 39: 104–11
25. Launer LJ, Andersen K, Dewey ME et al: Rates and risk factors for dementia and Alzheimer's disease Results from EURODEM pooled analyses. Neurology, 1999; 52: 78–84
26. Liebetrau M, Steen B, Skoog I: Stroke in 85-year-olds: Prevalence, incidence, risk factors, and relation to mortality and dementia. Stroke, 2003; 34: 2617–22
27. Gilsanz P, Mayeda ER, Glymour MM et al: Female sex, early-onset hypertension, and risk of dementia. Neurology, 2017; 89: 1886
28. Ohkura T, Isse K, Akazawa K et al: Evaluation of estrogen treatment in female patients with dementia of the Alzheimer type. Endocrine J, 2006; 41: 361
29. Xu W, Tan L, Wang HF et al: Education and risk of dementia: Dose-response meta-analysis of prospective cohort studies. Mol Neurobiol, 2016; 53: 3113–23
30. Benito-León J, Contador I, Louis ED et al: Education and risk of incident dementia during the premotor and motor phases of essential tremor (NEDICES). Medicine (Baltimore), 2016; 95: e4607
31. Zhang M, Katzman R, Salmon D et al: The prevalence of dementia and Alzheimer's disease in Shanghai, China: Impact of age, gender, and education. Ann Neurol, 1990; 27: 428–37
32. Zhou DF, Wu CS, Qi H et al: Prevalence of dementia in rural China: Impact of age, gender and education. Acta Neurol Scand, 2006; 114: 273–80
33. Millian M, Leiherr AM, Straten G et al: The Mini-cog versus the mini-cog state examination and the clock drawing test in daily clinical practice: Screening value in a German Memory Clinic. Int Psychogeriatr, 2012; 24: 766–74
34. Li X, Dai J, Zhao S et al: Comparison of the value of Mini-cog and MMSE screening in the rapid identification of Chinese outpatients with mild cognitive impairment. Medicine (Baltimore), 2018; 97: e10966
35. Bazin N, Bratu L: Depression in the elderly: Prodroma or risk factor for dementia? A critical review of the literature. Geriatr Psychol Neuropsychiatr Vieil, 2014; 12: 289–97
36. Chen R, Hu Z, Wei L et al: Is the relationship between syndromes of depression and dementia temporal? The MRC-ALPHA and Hefei-China studies. Psychol Med, 2009; 39: 425–30
37. Leong C: Antidepressants for depression in patients with dementia: A review of the literature. Consult Pharm, 2014; 29: 254–63
38. Orgeta V, Qazi A, Spector A et al: Psychological treatments for depression and anxiety in dementia and mild cognitive impairment: Systematic review and meta-analysis. Br J Psychiatry, 2015; 207: 293–98
39. Fei M, Yan Ping Z, Ru Juan M et al: Risk factors for dementia with type 2 diabetes mellitus among elderly people in China. Age Ageing, 2013; 42: 398–400
40. Zhao Q, Xiong Y, Ding D et al: Synergistic effect between apolipoprotein E ε4 and diabetes mellitus for dementia: Result from a population-based study in urban China. J Alzheimer Dis, 2012; 32: 1019–27
41. Meng XF, Yu JT, Wang HF et al: Midlife vascular risk factors and the risk of Alzheimer's disease: A systematic review and meta-analysis. J Alzheimer Dis, 2014; 42: 1295–310
42. Perrotta M, Lembo G, Carnevale D: Hypertension and dementia: Epidemiological and experimental evidence revealing a detrimental relationship. Int J Mol Sci, 2016; 17: 347
43. Tsai CH, Chuang CS, Hung CH et al: Fracture as an independent risk factor of dementia: A nationwide population-based cohort study. Medicine, 2014; 93: e188
44. Jalbert JJ, Eaton CB, Miller SC et al: Antipsychotic use and the risk of hip fracture among older adults afflicted with dementia. J Am Med Dir Assoc, 2010; 11: 120–27
45. Seitz DP, Adunuri N, Gill SS et al: Prevalence of dementia and cognitive impairment among older adults with hip fractures. J Am Med Dir Assoc, 2011; 12: 556–64
46. Buchner DM, Larson EB: Falls and fractures in patients with Alzheimer-type dementia. JAMA, 1987; 257: 1492–95
47. Scandol JP, Toson B, Close JCT: Fall-related hip fracture hospitalisations and the prevalence of dementia within older people in New South Wales, Australia: An analysis of linked data. Injury, 2013; 44: 776–83
48. Chang KH, Chung CJ, Lin CL et al: Increased risk of dementia in patients with osteoporosis: A population-based retrospective cohort analysis. Age, 2014; 36: 967–75
49. Zandi PP, Carlson MC, Plassman BL et al: Hormone replacement therapy and incidence of Alzheimer disease in older women: The Cache County Study. JAMA, 2002; 288: 2123–29

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