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The prevalence of dementia with Lewy bodies in a rural area of China

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ABSTRACT

Introduction: Data on the prevalence of dementia with Lewy bodies (DLB) in China are limited. The aim of this study was to estimate the prevalence of DLB in individuals aged 60 years and older and to analyze the associated risk factors and clinical features of DLB.

Methods: We conducted a cross-sectional, two-phase, door-to-door, population-based study that included 5542 participants aged at least 60 years who resided in Ji County. In phase I of the study, we used the Mini-Mental State Examination, the Clinical Dementia Rating scale, and the Activities of Daily Living scale to screen for dementia. Any person who was suspected of having dementia underwent a clinical examination, blood tests, and a neuroimaging examination to confirm the diagnosis of dementia. In phase II of the study, we further screened eligible participants for DLB using consensus guidelines for the clinical and pathologic diagnosis of DLB.

Results: The overall prevalence of DLB in the total population of 5542 study participants was 1.05%; the prevalence of DLB was 10.10% in the population with dementia. Compared to individuals without cognitive impairment, patients with DLB were less engaged in social activities. Having fewer than 5 years of formal education might be a risk factor for DLB. The three core symptoms of DLB – fluctuating cognition, visual hallucinations, and Parkinsonism – were observed in 60.34%, 68.97%, and 63.79% of patients with DLB, respectively.

Conclusion: Our study provides the first information of the prevalence of DLB in a rural area of China.

1. Introduction

The Chinese population is expected to age substantially, and, along with this aging process, the prevalence of dementia will increase rapidly, likely at a higher rate than is seen among the aging global population. Dementia with Lewy bodies (DLB) is reported to be the second most common subtype of dementia in older people, following Alzheimer's disease (AD) [1]. There is some evidence that suggests that DLB is a more rapidly progressing form of dementia than AD, and recent studies have reported a more severe disease course with shorter survival, higher rates of nursing home admission, and higher costs with DLB than with AD [2,3]. According to previous reports of the frequency of occurrence of DLB, this dementia subtype is estimated to account for 15%–35% of all cases of dementia [4]. However, DLB remains under-diagnosed, and more than 50% of cases do not receive a correct diagnosis [5].

DLB is characterized clinically by symptoms such as visual hallucinations, Parkinsonism, and fluctuating cognition; cognitive impairment is also evident, usually with more visuospatial and executive impairment relative to memory impairment [6]. DLB also causes diminished quality of life, caregiver burdens, and care challenges for patients, caregivers, and providers distinct from those of other forms of dementia. Dementia is a substantial public health issue, since dementia not only intensifies the challenges of aging societies but also raises awareness of mental health in the oldest patients.

China has the largest population of any country in the world, and, as such, China will face considerable challenges in adapting to its aging population and rising numbers of people with dementia.

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Recent studies reported that 8.4 million (4.6%) people in China had dementia [7]. To date, most research has focused on the prevalence of Alzheimer's disease (AD) and vascular dementia (VD) in Chinese populations, and few surveys have been conducted to evaluate the prevalence of DLB, particularly in rural areas of China. Studies on the prevalence and incidence of DLB are important for both healthcare planning and epidemiological research, since they provide essential knowledge to assess the burden of the disease within a population. Therefore, we conducted this study to estimate the prevalence and define the characteristics of DLB in China.

2. Methods

2.1. Study population

This study was conducted in Ji County, a rural area of northern China, which is located in the northern part of Tianjin. In 2012, the total area of the county was 1593 square kilometers, and the county had 949 administrative villages. According to China's sixth population census in 2010, Ji County had a permanent resident population of 780,000, which accounted for 1.16% of the rural population of China. The population density of Ji County was 494 people per square kilometer. This rural area has a mountainous terrain and most people are farmers. There is only one medical practitioner per village.

We conducted a cross-sectional, door-to-door, population-based study across 56 villages in Ji County. Enrolled participants had been living in the area for more than 5 years. We identified all individuals aged 60 years or older by reviewing the date of birth provided on residence certificates. The rural doctors in each village had an average work history of 6.21 ± 3.48 years; these doctors assisted in identifying individuals to be included in the study.

Written informed consent was obtained from all participants or their assigned surrogate decision-makers. The study was approved by the Committee for Medical Research Ethics at the Tianjin Huanhu Hospital.

2.2. Phase I: screening interview

In phase I of the study, we performed a door-to-door screening of residents aged 60 years or older. The residents were contacted directly by knocking on their doors; the purpose of the visit was explained to them and they were invited to participate in the study. After written informed consent was obtained from the participants, a home interview was conducted by at least two members of a team that comprised 10 medical practitioners. The medical practitioners had been trained to collect information in a uniform manner by two neurologists specializing in dementia from the Dementia Center of Tianjin Huanhu Hospital. The interviewers recorded personal information, medical history, findings of physical examinations, and cognitive changes; the interviewers also evaluated all study participants with the Chinese Mini-Mental State Examination (C-MMSE) [8], the Clinical Dementia Rating (CDR) scale [9], and the Activities of Daily Living (ADL) scale [10].If the participants could not provide the necessary information themselves, reliable informants, including, in descending order, spouses, children, and other relatives and close friends, were asked to complete the interview. Participants with a C-MMSE score below the cutoff points (18 for illiterate persons, 24 for persons with 1–11 years of education, and 27 for persons with 12 or more years of education) and/or a CDR of 0.5 or higher were deemed eligible for phase II of the study. The average duration of a phase I interview was 60 min. Any person who was suspected of having dementia underwent a physical examination, blood tests (thyroid function, syphilis, HIV, and vitamin B12 level), and a neuroimaging examination (magnetic resonance imaging [MRI] or computed tomography [CT], if the participant could not undergo MRI) to obtain or exclude a diagnosis of dementia.

2.3. Phase II: neurological consultation

Participants who were eligible for phase II of the study were examined for the presence of DLB. This assessment was conducted during the second home interview, and two members of a team of six board-certificated neurologists from the Dementia Center of Tianjin Huanhu Hospital conducted the assessment. The six neurologists were trained together to ensure uniform neurological consultation of all participants. The information obtained from the physical examination and the neuroimaging examination was evaluated again, and, if the situation of the patient was complicated or the diagnosis of DLB was difficult to make, the patient underwent a ^{11}C-PIB PET scan and a ^{18}F-FDG PET scan.

2.4. Criteria for dementia and DLB

In this study, we diagnosed dementia on the basis of the Diagnostic and Statistical Manual of Mental Disorders IV criteria [11]. We also used consensus guidelines for the clinical and pathologic diagnosis of DLB to diagnose DLB [6].

2.5. Data analysis

We calculated the prevalences of dementia and probable DLB with respect to the total study sample. We also calculated the prevalences and respective 95% confidence intervals (CIs) according to 5-year age groups, sex, and educational level. Educational attainment was classified as 5 or fewer years or more than 5 years of formal education. The participant's marital status was categorized as married or widowed/separated, which included single or divorced.

Frequency distributions were used to analyze the qualitative variables. The Chi-square test was used to assess the sociodemographic and clinical factors associated with the presence of DLB. For all tests, the significance level was established at $P < 0.05$. SPSS software version 16.0 (SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses.

3. Results

There were 5728 residents in Ji County aged 60 years or older. Fig. 1 illustrates the general design of the door-to-door, two-phase prevalence survey, as well as the number of participants involved at each step. Thirteen residents had died or moved away before the start of the survey. A total of 5542 participants completed the two phases of the study. People who suffered from hearing loss (n = 115) and people who refused to participate (n = 58) were not included in the study. In all, 574 (10.36%) participants were diagnosed with some form of dementia. Among these individuals, 58 (1.05%) participants were diagnosed with DLB.

Table 1 shows the prevalences of dementia and DLB according to sex, age, and educational level. The overall prevalence of dementia was 10.36%, and the prevalence was higher in females (12.22%) than in males (8.03%). The overall prevalence of DLB in the total population was 1.05% and the prevalence of DLB in the dementia population was 10.10%. The prevalence of DLB in males in the total population was 1.22% and the prevalence in males in the dementia population was 15.15%; both of these rates were higher than in females (0.91% and 7.45%, respectively). The age-specific prevalences for both dementia and DLB in the total population increased with advancing age and lower educational levels.