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Prevalence of mild cognitive impairment and its subtypes in community-dwelling residents aged 65 years or older in Guangzhou, China

Dongping Rao, Xiong Luo, Muni Tang*, Yin Shen, Ruoyan Huang, Junchang Yu, Jianjuan Ren, Xiaoying Cheng, Kangguang Lin

Department of Psychiatry, the Affiliated Brain Hospital of Guangzhou Medical University (Guangzhou Huiai Hospital), Guangzhou, China

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ABSTRACT

Background: Prevalence of mild cognitive impairment (MCI) has been reported substantial variations, and mostly in Western countries. Less is known about MCI in the south of China. The study is to estimate the prevalence of MCI and its subtypes in residents aged 65 year or older in community-dwelling residents of Guangzhou, China.

Methods: The study was a community-based, cross-sectional study conducted in rural and urban areas of Guangzhou between April and October 2009. Eight communities were randomly selected using a cluster sampling method. Each elderly was interviewed with Montreal Cognitive Assessment, the Mini-Mental state examination, Auditory Verbal Learning Test, the Clinical Dementia Rating scale et al. MCI was classified as amnestic MCI (a-MCI) or nonamnestic MCI (na-MCI).

Results: 2427 individuals were contacted, but in-person interviews were conducted with 2111 participants. 299 participants with MCI were identified. The prevalence of MCI, a-MCI and na-MCI was 14.2%, 12.2%, 2.0% respectively. The prevalence of MCI and a-MCI increased with age, decreased with education level, and was higher in rural areas than in urban areas. The difference of prevalence of MCI and a-MCI between women with men wasn't statistically significant(MCI$\chi 2$ = 1.0, OR 0.9, 95%CI = 0.6-1.2; a-MCI$\chi 2$ = 1.0, OR 0.9, 95%CI = 0.6–1.2), when controlling for education by logistic regression analysis.

Conclusions: The results suggest that 14.2% of elderly individuals are affected by MCI in Guangzhou, China. And MCI was dominated by a-MCI. The prevalence of MCI and a-MCI increased with age, decreased with education level, and was higher in the rural population compared to the urban population.

1. Introduction

With the rapid growth in the number of older adults, age-related diseases are becoming increasingly common. As such, the prevention and treatment of chronic diseases of aging are of great importance. Mild cognitive impairment (MCI) has become a hot research topic in recent years. MCI is an intermediate condition between normal aging and dementia that is characterized by mild cognitive deficits. People with MCI can have problems with language, thinking, memory, and judgment that are more serious than those associated with normal age-related changes but not significant enough to interfere with the activities of daily life (Albert et al., 2011). The cause of MCI is unknown. However, it appears to have similar risk factors to Alzheimer's disease (AD), and it may represent a significant risk factor for dementia. Petersen and colleagues initially characterized MCI as a condition involving memory deficits that was presumed to represent an early manifestation of AD, with an annual conversion rate to mild AD of about 10–15% (Grundman et al., 2004; Petersen et al., 1999).

A systematic review reported that the prevalence of MCI ranges from 0.5% to 42% (Ward, Arrighi, Michels, & Cedarbaum, 2012), and recent studies from America, Australia, Bulgaria, Japan, and Mexico reported that the prevalence of MCI ranges from 6.5% to 39.1% (Katz et al., 2012; Petersen et al., 2010; Sachdev et al., 2012; Yaffe et al., 2011; Dimitrov, Tzourio, Milanov, Deleva, & Traykov, 2012; Juarez-Cedillo et al., 2012; Wada-Isoc et al., 2012). There are many reasons that may explain the wide range of prevalences. For example, the sample compositions are different, as the different samples include hospital patients or community members. The sample size, assessment tools, survey methods, and environmental and cultural factors could also have affected the results.

The age structure of the population has changed greatly over the last few decades, with a decrease in mortality and an increase in life

* Corresponding author at: Guangzhou Huiai Hospital, Mingxin Rd. #36, Liwan District, Guangzhou, China.
E-mail address: tangmuni@hotmail.com (M. Tang).

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expectancy. The global population aged ≥60 years is expected to increase from 605 million in 2000 to 1.2 billion by 2025 and 2 billion by 2050, and about two-thirds of them live in low- to middle-income countries. At present, there is a rapid growth of the elderly population in China, which will exceed 400 million by 2033 to represent the largest number of elderly individuals in any country in the world. China consists of many regions with different languages, each of which has different sociodemographic and socioeconomic characteristics, cultural traditions.

Since 2000, most of the studies on the prevalence of MCI in the Chinese population have come from eastern and western China, where the prevalence of MCI was reported to be 9.6% and 14.7%, respectively (Nie et al., 2011). In southern China, the prevalence of MCI among individuals aged ≥60 years (n = 410) was 21.46% in Shenzhen (Liu, Shao, Peng, & Ding, 2005). However, the sample size was small and the Mini-Mental State Examination (MMSE) was the main assessment instrument. The MMSE has a low sensitivity for detecting MCI (Dong et al., 2010). This may be due to the presence of a ceiling effect, especially among populations with higher education, and the lack of test items that assess executive function.

The Montreal Cognitive Assessment (MoCA) has gradually been developed as a brief screening tool for MCI that addresses the known limitations of the MMSE (Nasreddine et al., 2005). Since 2005, studies have reported that the MoCA showed excellent performance in discriminating MCI from normal cognition in elderly populations, with reported areas under the receiver operating characteristic (ROC) curve ranging between 0.82 and 0.95, a sensitivity from 0.79 to 0.97, and a specificity from 0.60 to 0.87 (Fujiwara et al., 2010; Lee et al., 2008; Wong et al., 2009; Freitas, Simoes, Alves, & Santana, 2012; Tsai et al., 2012; Memoria, Yassuda, Nakano, & Forlenza, 2013; Goldstein et al., 2014; Lu et al., 2011).

In the present population-based study, we estimated the prevalence of MCI, including both subtypes, by conducting a survey involving the MoCA and other neuropsychological evaluations of individuals aged ≥65 years in Guangzhou in southern China.

2. Methods

2.1. Ethics statement

The investigation was approved by the Ethics Committee of Guangzhou Huiai Hospital and all participants or their legally acceptable representatives gave informed consent in accordance with the guidelines of the Declaration of Helsinki of the World Medical Association Assembly.

2.2. Participants

All of the participants were aged 65 years or older and were members of the resident population or floating population who had stayed for > 1 month in the community involved in the study. The exclusion criteria were as follows: (1) member of the resident population who had been away for > 1 month; (2) member of the floating population that had stayed for < 1 month in the community involved in the study; (3) history of Parkinson's disease or stroke; (4) active psychiatric symptomatology that interfered with the ability to complete neuropsychological assessments; (5) visual or auditory impairments that precluded neuropsychological assessments. If a participant was not able to be contacted three times in a row at different times or refused to be assessed three times in a row at different times, they were considered lost to follow-up.

2.3. Sampling method

The study was a community-based, cross-sectional study conducted in rural and urban areas of Guangzhou between April and October 2009. According to the 2009 Chinese census, the city had a population of 7.94 million people. There are 12 districts and 1500 communities, including rural and urban areas. Eight communities were randomly selected using a cluster sampling method.

2.4. Neuropsychological assessments and personal information questionnaire

The MoCA (Nasreddine et al., 2005) and MMSE (Folstein, Folstein, & McHugh, 1975) were administered to assess each participant's global neuropsychological status. Memory was assessed using the World Health Organization–University of California–Los Angeles Auditory Verbal Learning Test (Maj et al., 1994), including immediate recall, short-delay free recall (3 min), and long-delay free recall (30 min). Executive function was assessed using the Trail Making Test B (Reitan, 1958) and verbal fluency was measured using the Semantic Verbal Fluency Test (category, animals) (Zhao, Guo, & Hong, 2013). The Clock-Drawing Test (CDT) (Wolf-Klein, Silverstone, Levy, & Brod, 1898) was administered to measured visuo-constructive skills. The Clinical Dementia Rating (CDR) (Chang et al., 2011) was used to assess cognitive level. The Functional Activities Questionnaire (FAQ) (Pfeffer, Kurosaki, Chance, & Filos, 1982) was applied to assess social functions. The Hachinski Ischemic Scale (HIS) (Hachinski et al., 1975) was applied to differentiate degenerative and vascular etiologies related to the development of dementia symptoms and the Center for Epidemiologic Studies Depression Scale (CESD) (Lewinsohn, Seeley, Roberts, & Allen, 1997) was administered to assess mood.

A questionnaire was designed to collect information about the subjects' demographic factors, lifestyle, and medical history, and general and neurological physical examinations were performed. The medical records were reviewed for medical history, such as injuries and fractures, chronic diseases, and family history of dementia. The general physical examination included vital signs, height, and weight. The neurological physical examination focused on loss of sensation, signs of Parkinsonism, ability to stand and walk with reasonable stability, and cerebral abnormalities.

2.5. MCI diagnostic criteria

The MCI diagnostic criteria were applied retrospectively among the individuals deemed not to have dementia. The MCI diagnostic criteria were as follows: (1) cognitive concern or complaint by the subject or a person familiar with the subject, with a CDR score of 0.5; (2) objective impairment in one or more cognitive domain (memory, executive function, visuo-constructive skills, or verbal fluency), based on performance 1.5 standard deviation below that expected for the subject's age and education; (3) essentially normal functional activity, based on the results of the CDR and FAQ; and (4) absence of dementia, based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).

MCI was divided into amnestic MCI (a-MCI) and non-amnestic MCI (na-MCI) (Petersen, 2004). Individuals in the a-MCI group had impaired memory and their condition was progressing slowly, with a Hachinski Ischemic Scale score of ≤2. Individuals in the na-MCI group had no impairment in memory or did not meet the aforementioned a-MCI criteria.

2.6. Assessment and diagnosis procedure

The research team included ten psychiatrists, five senior graduate students specializing in neurology, and two neuropsychologists with special expertise in cognitive impairment disorders. All interviewers and experts received uniform training on the neuropsychological tests and diagnosis procedure for two weeks.

A face-to-face interview was held with each participant. People familiar with the subject (i.e., family members and neighbors who were