Original Article

Cognitive Training in Older Adults with Mild Cognitive Impairment

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Abstract

Objective We investigated the feasibility and efficacy of cognitive training for older adults in rural settings and with low education levels, who have mild cognitive impairment (MCI).

Methods Forty-five older adults (ages >65 years) with MCI were assigned to treatment or control groups, at a 2:1 ratio. Cognitive training occurred in the treatment group for 2 months. The cognitive abilities of the participants were assessed at pre-training, metaphase, and post-training time points, using the Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA), Loewenstein Occupational Therapy Cognitive Assessment (LOTCA), and Hamilton Depression Scale (HAM-D).

Results Following training, cognitive abilities improved in the treatment group, based on the total scores of all 4 measures, as well as specifically on the MoCA and LOTCA. There were differences in the main effects of group and time point on some subscales, but these differences had little, if any, effect on the overall analyses.

Conclusion The present study demonstrated that cognitive training has beneficial effects on attention, language, orientation, visual perception, organization of visual movement, and logical questioning in patients with MCI. Furthermore, the observed effects are long-term changes.

Key words: Older adults; Rural; Mild cognitive impairment; Cognitive training; Efficacy

Biomed Environ Sci, 2016; 29(5): 356-364 *doi: 10.3967/bes2016.046* *ISSN: 0895-3988*

www.besjournal.com (full text) *CN: 11-2816/Q*

INTRODUCTION

Mild cognitive impairment (MCI) describes a transitional stage between normal aging and dementia, and is clinically represented by memory complaints and objective evidence of cognitive impairment, in the absence of evidence of dementia[1-3]. MCI is characterized by confusion, disorientation, restricted attention, and memory impairment, as well as restricted learning and language abilities[4]. Prevalence rates of MCI within older adult populations have been estimated at 3%-42%[5], and the conversion rates between MCI and dementia are estimated at 2%-31%, with a mean annual conversion rate of 10.2%[6]. In addition to age and

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certain diseases, social, psychological, and lifestyle factors may contribute to declines in cognitive functioning[7]. Dementia has become a serious health problem for older adults, in addition to conditions associated with normal aging[8-9]. Previous research has demonstrated that training and treatment are beneficial for patients with MCI and dementia[10]. Therefore, effective training and treatment may prevent MCI and dementia.

Ball et al. conducted a cognitive training study with 2832 elderly adults. The study included memory training and cognitive processing, and the results demonstrated that cognitive functioning improved in the treatment group after a period of 2 to 5 years[11]. Cognitive functioning and activities of daily living (ADL) also declined slowly in this study. In addition, Jean performed a systematic review and concluded that cognitive training for older adults improves memory capacity[12].

Research on cognitive functioning began in China in the 1980s[13-15]. This initial research primarily focused on basic cognitive research and factors relevant to MCI. After 2000, researchers found that early training and treatment for MCI reduce the conversion rate from MCI to Alzheimer's disease (AD), and this topic has gained progressively more interest in China[16-17]. Qiao et al. conducted a self-control study and provided training to 30 patients with MCI, including for self-management, maintaining a healthy lifestyle, self-help intelligence (such as intelligence tests or games), self-help physical skills, and communication[18]. After training, cognitive functioning improved significantly in patients with MCI. Zhang et al. conducted cognitive functioning training with older adults in the community, including that for tasks such as recognizing photographs, arithmetic, memory, attention, orientation, ability to calculate, and executive ability[19]. After 6 months, the cognitive abilities of these older adults were enhanced, especially for memory, attention, and orientation. Previous research on MCI in China involved older adults who lived in the city and had high education levels[20-21]. Education levels of older adults residing in rural China are low[22] and previous studies have not investigated whether cognitive training is effective in these populations. In addition, the previous research on cognition did not focus on the effects of training[23]. Thus, we evaluated the effects of cognitive training in older adults with MCI who reside in rural areas, using a variety of standardized scales.

METHODS

Data Source

Data were derived from research funded by the Department of Health (Heilongjiang province; study on mild cognitive impairment of older adults residing in rural Heilongjiang province). The research was conducted at a health center in Si Duan village. We used cluster sampling to select 520 participants from the data set, including 66 older adults who were diagnosed with MCI. Forty-five patients with MCI were available and willing to attend our cognitive training.

Participants and Criteria

We adopted the criteria established by Petersen et al. for clinical diagnosis of MCI: 1) subjective patient, other informant, or a clinician report of cognitive decline over time, 2) objective evidence of cognitive impairment in one or more cognitive domains using formal or bedside testing, 3) the impact of cognitive impairments on daily functioning does not preclude independence, and 4) the patient does not meet criteria for dementia[1].

Training and Assessment Instruments

We established a training research group consisting of trained researchers. Forty-five patients with MCI who met our inclusion criteria were randomly assigned to treatment or control groups at a 2:1 ratio. These patients with MCI were first assigned numbers from 1-45, and 45 random 2 digit numbers were then selected in any 2 rows of a random number table. Based on this process, patients with numbers 1-30 were assigned to the training group and patients with numbers 31-45 were assigned to a no treatment control group. Prior to training, we conducted between group comparisons for demographic information and cognitive abilities [age, years of education, gender, Mini-Mental State Examination (MMSE) scores, and Activities of Daily Lving (ADL)], in order to ensure that there were no preexisting differences between the groups. The control group did not receive any treatment, in order to allow us to evaluate potential non-treatment related changes over time and ensure accurate interpretations of the results. The treatment group consisted of 30 patients with MCI, and was further divided into 8 subgroups (3-5 patients per subgroup). The at-home training occurred for 2 months, with each subgroup receiving 2 h/d of training. There were 5 aspects of training, including training for attention, memory,