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Effects of Mind-Body Exercises on the Elderly with Mild Cognitive Impairment: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 03 August 2023 and was last updated on 03 August 2023.

INTRODUCTION

Review question / Objective To determine the effectiveness of mind-body exercises in improving cognition, memory, executive function and depression in older adults with mild cognitive impairment.

Condition being studied Mild cognitive impairment (mild cognitive impairment, MCI) is the transition status between normal cognitive changes and dementia (or Alzheimer's disease) during aging, and the prevalence of MCI in the elderly (60 years) in China is as high as 14.0%~15.5%. The 2-year follow-up cumulative incidence of dementia in MCI patients over 65 years was 14.9%; in another 3-year multicenter randomized clinical trial, 16% of forgotten MCI (amnesic MCI, aMCI) patients developed Alzheimer's disease. However, only 14%~40% of MCI patients remain stable state or return to normal, therefore, exploring effective interventions for MCI is crucial to delay the occurrence and development of dementia. Exercise therapy can

improve cognitive function in patients with MCI with good easy availability and economical.

METHODS

Participant or population Patients with MCI were included in the study by referring to the diagnostic criteria of Petersen et al. [11] or Expert Recommendations on the Diagnosis and Treatment Process of Cognitive Impairment in the Elderly People.

Intervention Mind-body exercises (Pilates, Yoga, Qigong, Wuqinxi, Liuzijue, Tai Chi, Baduanjin, Mind-Body Therapies, and Yijinjing).

Comparator Conventional exercise or routine nursing measures.

Study designs to be included Two trained researchers independently evaluated the quality of the included literature according to the risk bias assessment tool provided by the Cochrane systematic review [12], including the generation of

random sequences, the concealment of allocation, the blinding of subjects and implemutors, and the quality of the included literature. Blinding of study results evaluators, integrity of results data, selective reporting of data, and other sources of bias. In each of the included literatures, "yes" (low degree of bias), "no" (high degree of bias) and "unclear" (lack of relevant information).

Eligibility criteria Inclusion and exclusion criteria Inclusion criteria ① Study type: RCTs of exercise therapy for overall function in older adults with MCI were excluded from other types of trials in order to ensure high quality evidence of study results. ② Subjects: Patients with MCI were included in the study by referring to the diagnostic criteria of Petersen et al. [11] or Expert Recommendations on the Diagnosis and Treatment Process of Cognitive Impairment in the Elderly People [7]. Memory: Wechsler Memory Scale (WMS-MQ), Auditory Word Learning Test Scale (AVLT), the California verbal learning test (CCVLT), Hopkins verbal learning test (HVLT), Rey Auditory Verbal Learning Test (RAVLT), Executive function and connection Test B Scale (TMT-B); Stroop Colour-Word Test (SCWT), Depression status: Geriatric Depression Status Scale (GDS); Exclusion criteria ① The cognitive impairment of the subjects was not clear; ② The subjects had neurological diseases other than MCI (i.e., Alzheimer's disease or other dementias, stroke, multiple sclerosis, traumatic brain injury, Parkinson's disease, focal brain disease, etc.); (3) Tai Chi, Qigong, meditation and other exercises as daily exercise; (4) The literature of motion type cannot be determined; (5) Incomplete or missing outcome indicators; ⑥ Literatures with randomization failure and significant differences in baseline data between groups; ⑦ Repeated publications. Data extraction and quality assessment.

Information sources Computer search PubMed, Embase, The Cochrane Library, Web of science, Scopus, Cinhal, the Chinese Biomedical Database (CBM), RCTs on physical and mental exercise and MCI patients were collected from the establishment of the database to June 20, 2023. In addition, references to the included literature were traced to supplement access to relevant literature.

Main outcome(s) This study included 9 randomized controlled trials (674 participants) from China, India, Australian, Thailand and American. The results of meta-analysis showed that compared with conventional exercise or routine nursing measures, physical and mental exercise

can improve the cognitive ability [MD=2.07, 95%CI:1.45-2.69, $p < 0.01$] and executive ability (TMT-B) of the elderly with mild cognitive impairment [MD=39.64, 95%CI: -44.85-34.42, $p < 0.05$], (SCWT (number)) [MD=3.03, 95%CI: 2.49-3.56, $P < 0.01$].

Quality assessment / Risk of bias analysis The 9 literatures included were all randomized controlled experimental studies, of which 5 described the random assignment method, 7 described the assignment hiding scheme, 5 described the implementation blind method, 6 described the outcome evaluation blind method, 9 reported complete data and results, and the rest were not clearly explained.

Strategy of data synthesis Meta-analysis was performed using RevMan 5.3 software. First, the heterogeneity among the studies was determined. If there was no significant heterogeneity ($P > 1.50\%$), the combined effect size was calculated using the fixed effect model; If heterogeneity exists ($P < 0.1$, $I^2 > 2$) However, when it is clinically judged that there is consistency among the groups and the combination is necessary, the combined effect size is calculated using the random effects model, and subgroup analysis is conducted to find the source of heterogeneity. If the heterogeneity was too large, only descriptive analysis was performed. Only measurement data are involved in this study, expressed by weighted mean difference (MD) or standardized mean difference (SMD) and 95%CI. The number of references included in this study was less than 10, and publication bias was not assessed. In order to judge the stability of the outcome indicators, the differences between the combined effect sizes were compared and sensitivity analysis was conducted by eliminating the included literatures one by one.

Subgroup analysis No subgroup analysis was performed.

Sensitivity analysis Seven articles reported the effects of mind-body exercise on cognitive function in patients with mild cognitive impairment, all of which were randomized controlled exercises. The results showed that there was statistical heterogeneity among the studies ($P = 0.006$, $I^2 = 96\%$), and the source of heterogeneity was determined by sensitivity analysis. After removing Chien Huiying et al. [18], the results showed that there was no significant heterogeneity among the included studies ($P = 0.01$, $I^2 = 0\%$). Therefore, a fixed effect model was used for meta-analysis. The cognitive function of the psychosomatic exercise intervention group was higher than that of the

group without psychosomatic exercise training, and the combined effect was statistically significant [MD=2.07, 95%CI:1.45-2.69, $p < 0.01$]. There were three studies [12-13,15-18] on the effect of mind-body exercise on memory in patients with mild cognitive impairment. The results showed significant inter-study heterogeneity ($P=0.36$, $I^2=83\%$), and the source of heterogeneity was determined by sensitivity analysis. After excluding Harris A et al. [18], the results showed no significant heterogeneity among the included studies ($P=0.05$, $I^2=28\%$), so the fixed-effect model was used for meta-analysis. The group that implemented psychosomatic exercise was significantly higher than the group that did not receive psychosomatic exercise, and the combined effect had statistical significance $< MD=7.19$, 95%CI: 3.83-10.55, $p < 0.05$].

Country(ies) involved China (Zhongnan Hospital of Wuhan University).

Keywords mild cognitive impairment; the elderly; mind body exercises; review.

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