# Nutritional Interventions for the Prevention of Cognitive Impairment and Dementia in Developing Economies of East Asia: Systematic Review and Meta-Analysis

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## INTRODUCTION

Dementia represents one of the impending global health challenges, and low and middle-income countries (LMICs) are projected to greatly contribute to the rising dementia global burden. Currently, there is a lack of pharmacological treatment for dementia and therefore research efforts have focused on prevention, with the identification of early lifestyle, demographic and nutritional risk factors.

Diet may be an important modifiable risk factor for maintenance of cognitive health in later life. There are plausible suggestions to support the synergistic effects of certain nutrients, such as polyphenols, unsaturated fats and antioxidant vitamins, in having a beneficial role in the modulation of oxidative stress and neuro-inflammation – processes associated with cognitive decline. Therefore, the aim of this systematic review was to evaluate the current evidence on nutritional interventions for the prevention of dementia in developing economies in East Asia.

## INCLUSION CRITERIA & OUTCOMES

Inclusion: Randomised clinical trials [RCTs], conducted in adult humans [≥18 years], assessing the effect of nutritional interventions on cognitive performance, and / or incidence of mild cognitive impairment [MCI] or dementia.

Outcomes: [1] global cognitive performance and [2] domain specific cognitive performance. Data was pooled by random model analysis and estimates of effect size were given for each domain and sub-categorised according to the type of nutritional intervention.

## METHODS

Four comprehensive medical databases were searched from inception until February 2019: MEDLINE, EMBASE, PsycINFO and Scopus.
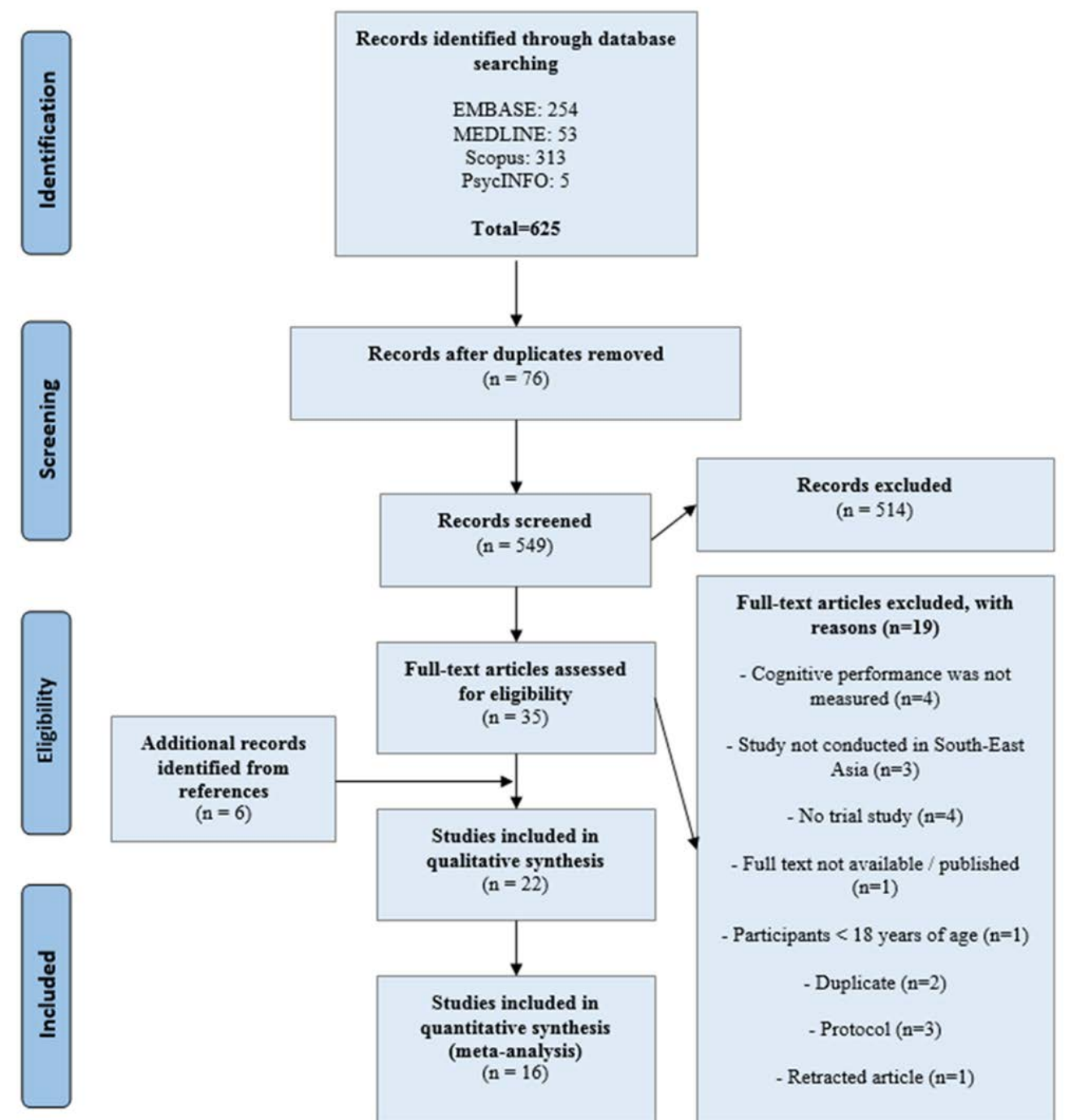


**Figure 1:** PRISMA flow diagram

## RESULTS

Twenty-two RCTs were included, of which, sixteen studies showed significant beneficial effects in favour of the nutritional intervention based on single neuropsychological test scores and / or scores of global cognitive assessment tools. Sixteen studies had sufficient data reported for meta-analysis, and marginally significant beneficial effects were found on global cognitive performance in elderly for micro-nutrient supplementation [n=4 studies, n=451 participants, std mean difference: 0.41 [-0.03; 0.84], p=0.07], and EPA / DHA supplementation [n=4 studies, n=373 participants, std mean difference 0.57 [-0.01; 1.14], p=0.06].

### Global cognitive performance

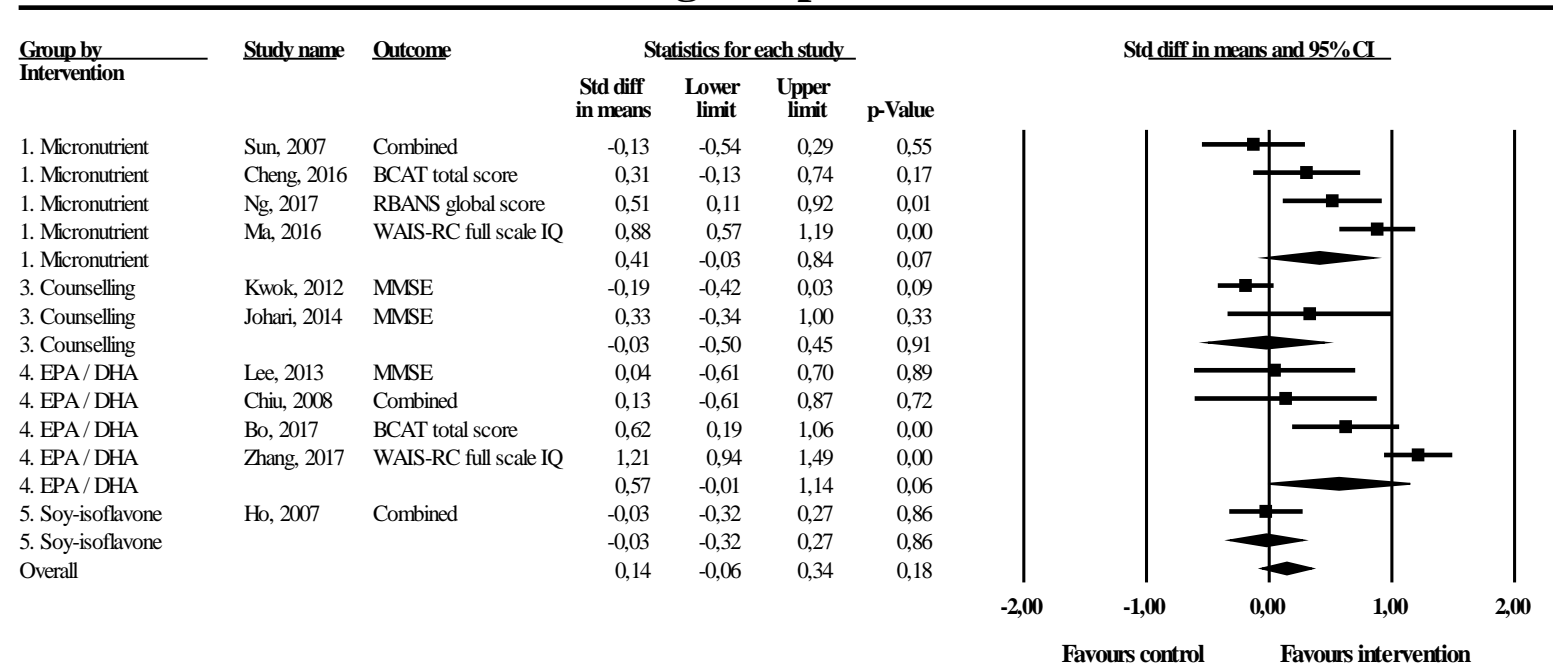| Group by Intervention | Study name | Outcome | Std diff in means | Lower limit | Upper limit | p-Value |
|---|---|---|---|---|---|---|
| 1. Micronutrient | Sun, 2007 | Combined | -0,13 | -0,54 | 0,29 | 0,55 |
| 1. Micronutrient | Cheng, 2016 | BCAT total score | 0,31 | -0,13 | 0,74 | 0,17 |
| 1. Micronutrient | Ng, 2017 | RBANS global score | 0,51 | 0,11 | 0,92 | 0,01 |
| 1. Micronutrient | Ma, 2016 | WAIS-RC full scale IQ | 0,88 | 0,57 | 1,19 | 0,00 |
| 1. Micronutrient | | | 0,41 | -0,03 | 0,84 | 0,07 |
| 3. Counselling | Kwok, 2012 | MMSE | -0,19 | -0,42 | 0,03 | 0,09 |
| 3. Counselling | Johari, 2014 | MMSE | 0,33 | -0,34 | 1,00 | 0,33 |
| 3. Counselling | | | -0,03 | -0,50 | 0,45 | 0,91 |
| 4. EPA / DHA | Lee, 2013 | MMSE | 0,04 | -0,61 | 0,70 | 0,89 |
| 4. EPA / DHA | Chiu, 2008 | Combined | 0,13 | -0,61 | 0,87 | 0,72 |
| 4. EPA / DHA | Bo, 2017 | BCAT total score | 0,62 | 0,19 | 1,06 | 0,00 |
| 4. EPA / DHA | Zhang, 2017 | WAIS-RC full scale IQ | 1,21 | 0,94 | 1,49 | 0,00 |
| 4. EPA / DHA | | | 0,57 | -0,01 | 1,14 | 0,06 |
| 5. Soy-isoflavone | Ho, 2007 | Combined | -0,03 | -0,32 | 0,27 | 0,86 |
| 5. Soy-isoflavone | | | -0,03 | -0,32 | 0,27 | 0,86 |
| Overall | | | 0,14 | -0,06 | 0,34 | 0,18 |



**Figure 2:** Meta-analysis of the difference in pre / post cognitive performance scores between intervention and control group

## DISCUSSION

Several promising strategies, such as B-vitamin supplementation, EPA / DHA supplementation and nutrition and lifestyle counselling interventions, seem to be able to decrease age-related cognitive decline in East Asia. Large, good quality, long term trials are needed to confirm these findings, to further evaluate the role of nutritional interventions on cognitive function and to identify if these interventions are feasible and effective to decrease dementia incidence in developing economies, like East Asia.