P.O. Box 144345 Austin, TX 78714-4345 ▪ 512.926.4900 ▪ Fax: 512.926.2345 ▪ www.herbalgram.org

HerbClip™

File: ■ Bacopa (*Bacopa monnieri*)
■ Cognition
■ Working Memory

HC 031355-477

Date: July 31, 2013

RE: An Ethanolic Extract of Bacopa Safely Enhances Attention, Working Memory, Cognitive Processing, and Cholinergic Function in Healthy, Elderly Subjects

Peth-Nui T, Wattanathorn J, Muchimapura S, et al. Effects of 12-week *Bacopa monnieri* consumption on attention, cognitive processing, working memory, and functions of both cholinergic and monoaminergic systems in healthy elderly volunteers. *Evid Based Complement Alternat Med*. 2012;2012:606424. doi: 10.1155/2012/606424.

Bacopa (*Bacopa monnieri*) has been used as a nerve tonic and to treat neurological and neuropsychiatric disorders in Ayurvedic medicine for centuries. The authors hypothesize that bacopa may alter the cholinergic system. This would enhance attention and cognitive processing and ultimately enhance working memory. Attention and cognitive processing can be evaluated by characterizing event-related potentials (ERPs). One component of ERP is called N100. Its amplitude is modulated by selective attention. Another component is called P300. Its amplitude reflects attention and memory operations. The latencies of both components increase with aging, and the amplitudes are decreased with aging. The purpose of this randomized, double-blind, placebo-controlled pilot study was to evaluate the effect of bacopa on attention, cognitive processing, working memory, and cholinergic and monoaminergic function in elderly people.

Healthy subjects (n = 60; mean age = 62.6 years) participated in this study that was conducted at Khon Kaen University; Khon Kaen, Thailand. Included subjects were said to be free of any herbal or prescribed medication that might interfere with nervous system function. The study excluded habitual smokers consuming > 10 cigarettes/day and any subjects who would have difficulty abstaining from smoking during the study. Subjects were instructed to abstain from caffeine and alcohol for ≥ 12 hours prior to the test session. Subjects were given tablets of either placebo, 300 mg/day bacopa of extract, or 600 mg/day of bacopa extract for 12 weeks. The ethanolic extract of bacopa used in this study was said to be a "proprietary extract" prepared by the Faculty of Pharmaceutical Sciences at Naresuan University in Phitsanulok, and it was said to contain 5% saponins, including unreported amounts of bacoside A_3, bacopaside I and II, bacopaside X, and bacopasaponin C. The placebo tablet was said to have the same odor and color as the active tablet. It is unclear how this was accomplished. The battery of cognitive tests included working memory (word presentation, picture presentation, simple reaction time, digit vigilance task, choice reaction time, spatial working memory, and numeric working memory) and ERP assessment. There was an assessment of acetylcholinesterase (AChE) and monoamine oxidase (MAO) activity

via tests on venous blood after 8-hour fasts. There were no control groups reported for the assays, so findings must be accepted at face value. Subjects were assessed at baseline, 4 weeks, 8 weeks, and 12 weeks, and also 4 weeks after treatment.

There were no significant differences in mean age, education, or body mass index between groups. Table 1 shows the effect of bacopa on parameters of working memory compared with placebo. The 300 mg/day dose had a more robust effect than the 600 mg/day dose.

Table 1: Significant Effects of Bacopa on Working Memory Compared with Placebo

	300 mg/day Bacopa Group				**600 mg/day Bacopa Group**			
	4 weeks	8 weeks	12 weeks	4 weeks after	4 weeks	8 weeks	12 weeks	4 weeks after
Continuity of attention	P<0.001	P<0.001	P<0.001	P<0.001	—	—	—	—
Quality of memory	P<0.001	P<0.01	P<0.001	P<0.001	—	—	—	—
Speed of memory	—	P<0.05	P<0.01	P<0.01	P<0.01	P<0.05	P<0.01	P<0.01
Power of attention	—	P<0.01	P<0.01	P<0.001	—	P<0.05	P<0.05	P<0.01

Bacopa had no effect compared with placebo on N100 amplitude and P300 amplitude. N100 latency was significantly decreased compared with placebo at week 12 in both the 300 mg/day group ($P < 0.001$) and the 600 mg/day group ($P < 0.05$). P300 latency was significantly decreased compared with placebo at weeks 8 and 12 in the 300 mg/day group ($P < 0.05$ and $P < 0.01$, respectively) and at week 12 in the 600 mg/day group ($P < 0.05$). No significant changes were observed 4 weeks after the cessation of bacopa.

The 300 mg/day group had a significant reduction of AChE activity at week 4 through week 12 compared to placebo ($P < 0.01$-0.001). The 600 mg/day group only had a significant reduction of AChE activity at week 12 compared to placebo ($P < 0.01$). The significant changes in both groups persisted 4 weeks after the cessation of bacopa ($P < 0.01$, compared to placebo). There were no significant changes in MAO activity.

There were no serious adverse effects, no changes in hematological and biochemical values that would indicate toxicity, and no electrocardiogram (ECG) recordings outside normal limits. No subjects dropped out of the study.

The authors conclude that bacopa enhanced attention, cognitive processing, working memory, and cholinergic function. Bacopa may suppress the function of AChE in the brain, leading to increased levels of acetylcholine which can enhance attention and memory. Since mild cognitive impairment and early Alzheimer's disease are due in part to a decline in acetylcholine, bacopa may benefit these patients, but additional research is needed to evaluate bacopa's benefits for patients with these conditions.

—Heather S. Oliff, PhD

Referenced article can be downloaded at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3537209.