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

HerbClip™

File: ■ Korean Red Ginseng (*Panax ginseng*, Araliaceae)
■ Alzheimer's Disease
■ Cognitive Function
■ Electroencephalography

HC 041622-554

Date: October 14, 2016

RE: Korean Red Ginseng Improves Frontal Lobe Function and Increases Right Temporal Alpha Waves in Patients with Alzheimer's Disease

Heo JH, Park MH, Lee JH. Effect of Korean red ginseng on cognitive function and quantitative EEG in patients with Alzheimer's disease: a preliminary study. *J Altern Complement Med*. April 2016;22(4):280-285.

Alzheimer's disease (AD) is a neurodegenerative disease that results in loss of cognitive function. Electroencephalography (EEG) is used to measure the electrical activity of the brain. AD often alters brain activity and EEG studies show that anti-dementia medications increase brain activity in the higher frequencies and reduce brain activity in lower frequencies. Studies suggest that Korean red ginseng (KRG; *Panax ginseng*, Araliaceae) root provides neuroprotective effects and may slow the progression of AD. The goal of this preliminary uncontrolled study was to measure the effect of KRG on cognitive function and quantitative EEG in patients with AD.

Fourteen patients with AD were recruited from Seoul Medical Center in Seoul, South Korea. The average age of the patients was 74.93 ± 7.63. The National Institute of Neurological and Communicative Disorders and Stroke–Alzheimer's Disease and Related Disorders Association criteria were used to diagnose AD. Patients were excluded if they had psychiatric disorders, seizures, cognitive impairment due to stroke, neoplasia, infection, or hypoxic brain injury. Patients were also excluded if they were taking medications that affected brain function, such as psychoactive drugs or antidepressants.

Powdered KRG (Korea Tobacco & Ginseng Corporation; Daedeok District, Daejeon, South Korea) 6-year-old root was provided in capsules. Patients took 4.5 g of KRG per day for 12 weeks. The Frontal Assessment Battery (FAB) and Korean Mini-Mental State Examination (K-MMSE) were administered before treatment began and at the end of treatment. The FAB measures frontal lobe function and the K-MMSE measures global cognition. Quantitative EEG, monitoring 17 sites, was performed at the beginning and end of treatment.

No change was found in the K-MMSE score after treatment with KRG. However, FAB scores increased significantly ($P < 0.05$) after treatment with KRG; when patients were divided into non-responders (no change or decrease in FAB, $n = 5$) and responders (increase in FAB, $n = 9$) to KRG, the significance was $P < 0.01$ for the responder group.

For the quantitative EEG analysis, data were evaluated based on whether patients were responders or non-responders. Baseline EEG data did not significantly differ between responders and non-responders. After treatment, the responders had no significant change in relative delta power, a significant increase in relative alpha power in the right temporal area and relative theta power in the left parietal area, and a decrease in relative beta power in the right central area compared to baseline ($P < 0.05$ for all). Non-responders had no significant change in relative beta power, significant decreases in relative alpha power in many areas, and significant increases in relative delta power in the right occipital area and relative theta power in many areas compared to baseline ($P < 0.05$ for all).

The change in relative alpha power in the right hemisphere was significantly greater in the responders than in non-responders, especially in the right temporal area. Responders had increased relative alpha power in the occipital, parietal, and temporal areas of the brain, while non-responders had decreased relative alpha power in these areas ($P < 0.05$, 0.05, and 0.01, respectively). The changes in the other waves showed no significant differences.

Based on FAB scores, KRG improved frontal lobe function in patients with AD. Despite the observed increase in FAB scores, relative alpha power did not increase in the frontal areas; it increased only in posterior areas, especially the temporal area. This positive effect on quantitative EEG at the temporal lobe may be associated with enhanced memory function. Other studies have found that KRG improves cognition, including memory in patients with AD. The authors speculate that the study period may have been too short to produce a significant change in K-MMSE score.

The study was limited by its very small sample size, lack of a control, and relatively short duration. The authors suggest that additional studies are warranted to further elucidate the effect of KRG in patients with AD.

This study was supported by grants from the Korean Society of Ginseng 2012, funded by Korea Ginseng Corporation.

—Cheryl McCutchan, PhD

Referenced article provided with permission from Mary Ann Liebert, Inc., 2 Madison Ave., Larchmont, NY 10438; Telephone (914)834-3100; Fax (914)834-3582; email: info@liebert.com.