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**File: ■ Indian Frankincense (*Boswellia serrata*, Burseraceae)
■ Lemon Balm (*Melissa officinalis*, Lamiaceae)
■ Memory
■ Older Adults**

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RE: Initial Clinical Trial Finds that a Combination of Indian Frankincense and Lemon Balm May Improve Memory Function in Older Adults

Taghizadeh M, Maghaminejad F, Aghajani M, Rahmani M, Mahboubi M. The effect of tablet containing *Boswellia serrata* and *Melisa [sic] officinalis* extract on older adults' memory: A randomized controlled trial. *Arch Gerontol Geriatr.* March-April 2018;75:146-150.

As lifespans around the world increase, age-related health concerns become a growing medical issue. Memory loss and dementia affect many older adults, and prescription and non-prescription treatments for these conditions are commonly used. Of the range of herbal remedies available, limited research has been done on the potential of Indian frankincense (*Boswellia serrata*, Burseraceae) and lemon balm (*Melissa officinalis*, Lamiaceae) to improve memory. These plants have been used in Iranian traditional medicine for centuries in the treatment of neurological disorders, and individually have been reported to improve memory. Though an animal study reported that the combination was more effective than either plant individually, the authors found no human study that researched the combination for the treatment of memory loss. They conducted a clinical trial to assess the impact of the joint use of the 2 plants in treating memory issues among older adults.

The 30-day, randomized, double-blind, parallel-group, placebo-controlled clinical trial was conducted from August to September 2015 by the Kashan University of Medical Sciences; Kashan, Iran. Seventy older adults were recruited through multi-stage random sampling to take part in the study according to the following criteria: between the age of 60 and 74; fully conscious; able to speak; no history of psychological disorders or Alzheimer's disease; and no allergies to herbal medicine. Subjects would be removed from the trial if they missed 2 or more consecutive doses, were unable or chose not to follow-up, or had adverse effects. Subjects completed a demographic questionnaire and the Wechsler Memory Scale-Revised (WMS-R) before being assigned to the treatment group or control group by block randomization.

Flowering aerial parts of lemon balm were harvested in 2012 from the Medicinal Plant Research Center of Barij Essence Pharmaceutical Company; Kashan, Iran. Indian frankincense resin was purchased from Natural Remedies Pvt. Ltd.; Bangalore, Karnataka, India. Tablets were produced by Barij Essence Pharmaceutical Company (Kashan, Iran) and contained 290 mg of lemon balm extract and 27 mg of Indian frankincense extract. The

treatment also contained Avicel[®] (cellulose binder; FMC Corporation; Philadelphia, Pennsylvania), corn (*Zea mays*, Poaceae) starch, lactose monohydrate, and magnesium stearate adjuvant. The placebo (composition not given) was formulated to look identical to the treatment tablet, and both were packaged in the same manner. The treatment tablets and placebo were classified and coded by the formulation unit of the Research Center of Barij Essence Pharmaceutical Company. Subjects were instructed to take 1 tablet, twice a day (morning and night), and received the tablets in 30-tablet packages at the start of and halfway through the treatment. The second author conducted a follow-up by telephone each week, and the subjects were retested on the WMS-R at the end of the 30-day trial.

Seventeen subjects did not complete the study—of 4 subjects from the treatment group, 2 reported adverse effects and 2 withdrew from the study for other reasons; of 13 subjects from the control group, 2 reported adverse effects and the others were noncompliant, lost to follow-up, or hospitalized during the study. Fifty-three subjects completed the study, but the authors followed an intention-to-treat analysis; therefore, data for all 70 subjects were included in the analysis. Data were analyzed with chi-square test, paired t-test, one-way analysis of variance (ANOVA), and analysis of covariance (ANCOVA), using SPSS (Statistical Package for the Social Sciences) v13.

There were no significant differences in demographic characteristics (age, sex, employment, marital status, level of education) between the treatment and control groups ($P > 0.05$), though the treatment group was almost significantly older ($P = 0.07$). Similarly, the 2 groups showed no significant difference in their initial mean WMS-R scores, which included total memory and subscales for auditory immediate, visual immediate, immediate memory, and working memory ($P > 0.05$). Within the treatment group, the mean scores for total memory and all 4 subscales increased significantly at the end of the study ($P < 0.0001$ for all). The control group saw a significant increase in working memory at the end of the study ($P < 0.01$), but small improvements in the other subscales were nonsignificant. After treatment, there were significant differences between the 2 groups in auditory immediate ($P < 0.0001$), immediate memory ($P < 0.002$), and total memory ($P < 0.002$) scores.

This initial study on the joint use of Indian frankincense and lemon balm in the treatment of memory loss among older adults indicates that these herbs may help to increase memory function across multiple parameters. The authors acknowledge that this trial was of limited duration, and longer-term studies would serve to strengthen the research on the subject. The study saw almost a quarter of the subjects drop out for various reasons, and while they followed an intention-to-treat analysis, a larger sample size could provide a better assessment of the effectiveness of this remedy in treating memory loss in older adults.

The study was funded by Kashan University of Medical Sciences. One of the authors (Mahboubi) is an employee of the Medicinal Plant Research Center of Barij Essence Pharmaceutical Company.

—*Heather B. Leach, MSc*

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