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FILE: ▪Lemon Balm Extract
▪Mood
▪Cognitive Performance

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RE: Lemon Balm Effects on Mood and Cognitive Performance

Kennedy DO, Scholey AB, Tildesley NTJ, Perry EK, Wesnes KA. Modulation of mood and cognitive performance following acute administration of *Melissa officinalis* (lemon balm). *Pharmacology, Biochemistry and Behavior* 2002;72:953–964.

Lemon balm (*Melissa officinalis*) is a perennial herb that has been cultivated for over 2,000 years. In Europe during the Middle Ages, lemon balm was used for complaints related to nervous system disorders and to enhance memory. Currently, lemon balm is believed to have antibacterial, sedative, and spasmolytic effects. It is used to alleviate anxiety, stress, sleep problems, and gastrointestinal disorders. "In keeping with its long history of safe usage, no side effects have so far been reported," the authors note.

In general, lemon balm is sold in products that contain a combination of several herbs. The authors report that no human studies have been done to evaluate the effects of ingesting lemon balm alone. One study found that aromatherapy with lemon balm essential oil reduced agitation and increased social interactions in patients with severe dementia. The active ingredients in lemon balm that may be responsible for such effects include several monoterpenoid aldehydes, flavonoids, polyphenolic compounds, and monoterpene glycosides.

It has been suggested that lemon balm might have potential for treating Alzheimer's disease, because of the herb's possible central nervous system acetylcholine receptor activity and antioxidant activity. Thus, the authors decided to evaluate the cognitive effects of lemon balm in human subjects.

The current randomized, double-blind, crossover study evaluated the acute effects of lemon balm on mood and cognitive function in healthy adults. The lemon balm used in this study was a standardized commercial extract of *M. officinalis* manufactured by Pharmaton of Lugano, Switzerland. Young healthy volunteers (15 women and 5 men aged 18–22 years) each took single doses of lemon balm or placebo on five different study days. The study days were separated by seven-day washout periods. On the first of the five study days, subjects received no treatment but underwent a battery of cognitive tests in order to be familiarized with the procedures. On the next four study days, each subject was randomly allocated to receive either placebo or 300, 600, or 900 mg of *M. officinalis*

extract. Five identical testing sessions were completed by each subject on each study day. The first testing session was before treatment (lemon balm or placebo) was ingested, to evaluate baseline performance, and the other four testing sessions were 1, 2.5, 4, and 6 hours after treatment.

The tests included immediate and delayed word recall, simple reaction time, a digit vigilance task, choice reaction time, spatial working memory, numeric working memory, delayed word recognition, delayed picture recognition, and serial subtraction tasks. The scores were collapsed into four global outcome factors, namely accuracy and speed of attention and accuracy and speed of memory.

The results showed that only one of the global outcome factors, accuracy of attention, improved after ingestion of lemon balm. This cognitive function was enhanced at all time points after subjects took the 600 mg dose of *M. officinalis*. "Accuracy of attention is derived by calculating the combined percentage accuracy across the choice reaction time and digit vigilance tasks with adjustment for false alarms," the authors explain. However, several measures of memory performance were reduced after all doses of lemon balm, indicating that the herb interfered with memory processes. Compared with placebo, alertness was reduced after the 900-mg dose of lemon balm at all time points, and calmness was increased after the 300-mg dose at several time points.

"The pattern of results can be viewed as largely consistent with both the contemporary use of *Melissa* as a calming agent and mild sedative…and demonstrations of similar effects in both rodents…and sufferers from severe dementia," the authors conclude. They note that the lowest dose of lemon balm, 300 mg, had the most beneficial effect on mood (by increasing calmness) and also did not reduce memory performance. This suggests that therapeutic doses may fall at or below the lowest dose used in the current study. In contrast, the highest dose used in this study (900 mg) was detrimental overall to cognitive function and provided no benefits. The middle dose (600 mg) improved the accuracy of attention but impaired memory with no effects on mood.

The results suggest that low doses of lemon balm may enhance calmness and high doses may have a mild sedative effect. However, no evidence was found to support the historical use of lemon balm for enhancing memory by modulating the cholinergic neurotransmitter system. Therefore, according to the authors, this specific extract of *M. officinalis* did not show potential for alleviating the cholinergic disturbances of Alzheimer's disease, but a different extract, oil, or leaf of this herb might still produce these effects. The authors conclude that this study was the first to show modulation of cognitive performance and mood after ingestion of lemon balm, and further research is warranted.

—Christina Chase, MS, RD

The American Botanical Council has chosen not to include the original article due to a lack of response from the publisher.