Effect of Corn Grass Extract (Sleep Aid) on Sleep Quality and Mood State in Moderately-Stressed Adults

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Introduction

This study was a controlled supplementation trial of the effects of the **Savanna Health (Sleep Aid) dietary supplement** on stress/mood/sleep in a population of moderately stressed humans.

Stress is associated with changes in **mood state**, including increased feelings of fatigue, burnout, and **sleep** patterns.

Supplementation with the Savanna Health dietary supplement (Sleep Aid) was expected to reduce subjective stress and thus, also improve both sleep patterns and feelings of energy, mood, and vigor (the opposite psychological state from burnout).

The Savanna Health dietary supplement (Sleep Aid) is an extract from corn grass (*Zea mays*) that has been previously shown to be effective in relieving stress/tension under conditions of stress.

This study investigated the effects of the Savanna Health dietary supplement (Sleep Aid) on subjective stress, sleep quality, and mood state in moderately stressed men and women (e.g. busy people who would be expected to have high stress, sleep problems, and measurable mood disturbances).

Study Design

We screened approximately 75 study candidates and enrolled **60 appropriate subjects** into the study (those with "moderate" levels of perceived stress). We used a screening survey that we have used in past studies of stress/mood to identify individuals with moderately elevated levels of perceived stress. Subjects scoring 6 or greater on this screening survey were eligible for enrollment into the supplementation study (a score of 6-10 indicates moderate stress).

Subjects were randomized to receive the Savanna Health dietary supplement, (Sleep Aid; 30 subjects) or a look-alike Placebo (30 subjects) for **4 weeks**. Subjects were instructed to consume one "dropper" of the Sleep Aid supplement before bedtime.

The 4-week duration was selected as more representative of persistent changes in mood state that may result from superior hormone and neurotransmitter balance (as opposed to short-term changes in emotions that may be more closely linked with stressors of daily living).

At Baseline (week 0) and Post-supplementation (week 4), we assessed:

- **STRESS** (lifestyle, work-related, and family stressors) using both the **Yale Stress Survey** (Yale Medical School) and our screening survey (pre/post supplementation).
- **SLEEP** quality will be assessed using the **Pittsburgh Sleep Quality Index (PSQI)**
- **MOOD** (Vigor, Depression, Tension, Confusion, Fatigue, and Anxiety) using the validated **Profile of Mood States (POMS)** survey. Note: Depression is one of 6 mood state subscales on the POMS, which is not indicative of a "disease"
- **SLEEP PATTERNS** using the ZEO Sleep Monitor.

Savanna Health provided enough dietary supplement (Sleep Aid) and look-alike Placebo liquid for 35 subjects/group (70 total subjects to account for overage for potential drop outs). Supplements were packaged in plain-labeled bottles with coded labels ("A" or "B"). After the study was completed and data analysis performed, the blinding code was broken to reveal the "A" group to be the Sleep Aid and the "B" group to be Placebo.

Research Study Outline

- The study duration was 12 weeks including:
    - Ethical/Institutional Review Board (IRB) review and approval was granted by Aspire IRB (La Mesa, CA).
    - Rolling Subject Recruitment
    - 4-week Supplementation phase
    - Measures at baseline and post-supplementation of:
        - Overall Stress
        - Sleep Quality
        - Sleep Patterns
        - Global Mood State, plus 6 psychological subscales:
            - Depression* (one of 6 mood state subscales on the POMS, which is not indicative of a "disease")
            - Anxiety
            - Fatigue
            - Anger (Irritability)
            - Vigor (e.g. mental/physical energy levels)
            - Confusion (mental function)
    - Data analysis and Preparation of Scientific Presentation

RESEARCH STUDY OVERVIEW	
Sample size	60 men and women (N=30 per group)
IRB Approval and Subject Recruitment	4 weeks
Supplementation duration	4 weeks
Data Analysis	4 weeks
Measurements collected	Stress Levels @ Baseline and Week 4 Sleep Quality @ Baseline and Week 4 Sleep Patterns @ Baseline and Week 4 Mood State @ Baseline and Week 4
Inclusion criteria	· Healthy, asymptomatic adults · Informed consent · Screened for "moderate" stress level
Exclusion criteria	· Current disease symptoms · Inability to complete all measurements · Indication of "low" stress levels · Current use of incompatible dietary supplements or medications

RESULTS

Fifty-two subjects completed the 4-week trial. Eight subjects were lost to follow-up due to scheduling difficulties. No adverse effects were reported.

Group A / Corn Grass Extract = (N = 27, 18 Female / 9 Male)

Group B / Placebo = (N = 25, 17 Female / 8 Male)

Pittsburgh Sleep Quality Index (PSQI)

Measurement	**Baseline**	**Week 4**	**Note**
Duration			
Corn Grass (A)	1.04 ± 0.98	0.56 ± 0.85	NS
Placebo (B)	1.12 ± 0.73	0.68 ± 0.80	
Disturbance			
Corn Grass (A)	1.70 ± 0.61	1.33 ± 0.62	NS
Placebo (B)	1.72 ± 0.61	1.32 ± 0.56	
Latency			
Corn Grass (A)	0.85 ± 0.99	0.63 ± 0.79	33% faster asleep
Placebo (B)	1.64 ± 0.95	0.84 ± 0.90	
Dysfunction			
Corn Grass (A)	1.30 ± 0.54	0.96 ± 0.52	NS
Placebo (B)	1.28 ± 0.61	0.96 ± 0.68	
Efficiency			
Corn Grass (A)	0.63 ± 0.97	0.26 ± 0.59	50% better efficiency
Placebo (B)	0.84 ± 0.85	0.52 ± 0.71	
Quality			
Corn Grass (A)	1.52 ± 0.80	0.67 ± 0.48	40% better quality
Placebo (B)	1.56 ± 0.65	1.12 ± 0.97	
Medication Use			
Corn Grass (A)	0.48 ± 1.09	0.19 ± 0.62	32% fewer meds
Placebo (B)	0.76 ± 1.16	0.28 ± 0.74	
Total			
Corn Grass (A)	7.52 ± 4.11	4.59 ± 2.58	20% better quality
Placebo (B)	9.04 ± 3.41	5.72 ± 3.71	

Yale Stress Survey

Total Stress Index	Baseline	Week 4	Note
Corn Grass (A)	39.67 ± 8.57	35.33 ± 6.87	NS
Placebo (B)	39.60 ± 9.73	34.12 ± 10.56	

Profile of Mood States Survey (POMS)

Measure	Baseline	Week 4	Note
Tension	13.4 ± 7.1	7.9 ± 5.9	8% lower Tension
Corn Grass (A)	13.8 ± 7.3	8.6 ± 5.5	
Placebo (B)			
Depression* (one of 6 mood state subscales on the POMS, which is not indicative of a "disease")	15.3 ± 10.9	6.8 ± 6.9	15% lower Depression
Corn Grass (A)	14.2 ± 13.0	8.0 ± 7.9	
Placebo (B)			
Anger			
Corn Grass (A)	11.5 ± 8.6	6.4 ± 5.0	25% lower Anger
Placebo (B)	12.0 ± 10.7	8.0 ± 7.9	
Vigor			
Corn Grass (A)	12.4 ± 6.8	16.3 ± 7.1	NS
Placebo (B)	14.0 ± 6.9	17.0 ± 7.4	
Fatigue			
Corn Grass (A)	13.3 ± 6.7	8.2 ± 6.2	NS
Placebo (B)	12.6 ± 7.2	8.0 ± 6.3	
Confusion			
Corn Grass (A)	10.3 ± 5.3	7.0 ± 4.2	NS
Placebo (B)	9.2 ± 5.5	6.0 ± 4.2	
Global Mood State			
Corn Grass (A)	151 ± 35	120 ± 28	NS
Placebo (B)	148 ± 43	120 ± 32	

ZEO Sleep Monitor

Measure	Baseline	Week 4	Note
Sleep Quality (ZQ)			
Corn Grass (A)	79.0 ± 16.3	74.5 ± 11.9	8% better Quality
Placebo (B)	70.5 ± 19.0	68.6 ± 8.7	
Sleep Duration			
Corn Grass (A)	6.9 ± 1.2	7.0 ± 1.0	10% longer Sleep
Placebo (B)	6.4 ± 1.0	6.3 ± 0.8	
# Wakes			
Corn Grass (A)	5.9 ± 7.1	2.1 ± 2.5	30% fewer Wakes
Placebo (B)	3.8 ± 1.0	3.0 ± 1.5	
REM Time			
Corn Grass (A)	1.9 ± 0.5	1.85 ± 0.46	24% more REM time
Placebo (B)	1.5 ± 0.6	1.41 ± 0.30	

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Background

Overtraining syndrome (OTS) is a stress-related phenomenon experienced by elite-level and recreational athletes alike. Athletes are subjected to stressors from physical, psychological, and biochemical sources that may lead to OTS and significant decrements in mental and physical performance. OTS may be characterized by elevated perceived stress, reduced mood quality, increased tension/anxiety, and disrupted sleep quality/quantity; each of which can influence and compound the other, leading to a vicious cycle of increasingly poor performance, increased stress, and disrupted sleep patterns.

Methods

In this study, we supplemented moderately stressed subjects with an extract of monocot grasses (corn grass, wheat grass, and bamboo). Previous animal studies have shown significant anti-stress and relaxation benefits of monocot grass extracts (MGE), likely due to their content of plant metabolite 6-MBOA (6-methoxybenzoxazolinone) and its ability to influence serotonin levels. Fifty-two subjects were randomly assigned in double-blind fashion to receive MGE (N=27, 18 Female & 9 Male) or Placebo (N=25, 17 Female & 8 Male) for 4 weeks. We measured Mood State (Profile of Mood States), Sleep Quality (Pittsburgh Sleep Quality Index), and Sleep Patterns (ZEO Sleep Monitor) before and after 4 weeks of supplementation. Differences between MGE/Placebo at week 4 were analyzed by paired t-tests with an alpha level of 0.05 and reported as percent-difference between groups.

Results

Compared to the Placebo group, the MGE group (all $p < 0.05$):
-Had 8% less Tension (7.9 ± 5.9 v. 8.6 ± 5.5)
-Had 15% less Depression (6.8 ± 6.9 v. 8.0 ± 7.9)
-Had 25% less Irritability (6.4 ± 5.0 v. 8.0 ± 7.9)
-Fell asleep 33% faster (0.63 ± 0.79 v. 0.84 ± 0.90)
-Had 50% better sleep "efficiency" (0.26 ± 0.59 v. 0.52 ± 0.71)
-Had 40% better sleep "quality" (0.67 ± 0.48 v. 1.12 ± 0.97)
-Woke up 30% fewer times each night (2.1 ± 2.5 v. 3.0 ± 1.5)
-Experienced 24% more time in deep REM sleep (1.85 ± 0.46h v. 1.41 ± 0.30h)

Conclusion

Overall, these results indicate that the MGE supplement is effective in improving sleep quality and improving stress-related mood states in a population of moderately stressed subjects. Future studies are warranted to evaluate the specific effects of MGE in alleviating OTS in athletes and possibly improving physical and mental performance.

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