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A STUDY ON STRESS AND AROMATHERAPY INTERVENTION EFFICACY

By  
MCKINLEY JUNE SANGWIN

Undergraduate Thesis

presented in partial fulfillment of the requirements  
for the University Scholar distinction

Davidson Honors College  
University of Montana  
Missoula, MT

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Approved by:

Scott Richter, Department Chair  
Health and Human Performance

Linda Green, Faculty Mentor  
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## **ABSTRACT**

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A Study on Stress and Aromatherapy Intervention Efficacy

Faculty Mentor: Linda Green

Stress is one of the most common psychological conditions college students suffer. Stress is associated with anxiety, depression, high blood pressure, heart disease, disordered eating, irritability, decreased academic performance, and decreased life satisfaction. Intervention is needed. Essential oils are non-invasive and simple to use and were chosen for this study based on their potential ability to reduce stress. The aim of this study was to investigate the effectiveness of aromatherapy as a stress reduction tool for college students. This study took place in Aber Hall and involved residents of floors 6 and 7, as assigned by the residence life director. All residents residing on these floors were informed of the study. 10 subjects completed the study. All of the subjects were freshman females. Both groups were administered a pre-survey during the first week of the semester. The outcome measures were rated on a 1-10 scale, with 1 being the lowest and 10 being the highest level of stress, anxiety, energy, sleep quality, and muscle tension, aches, or stiffness. The treatment group received a two-part aroma inhalation intervention. Subjects in the treatment group were educated on aromatherapy and then picked a dram of chamomile, clary sage, or lavender. Drams were pre-mixed with jojoba oil at a 10% dilution rate. Subjects were guided through the application and usage of their essential oil. Subjects were instructed to use their essential oil two times daily via aroma inhalation throughout the duration of the study. Both groups were administered a post-survey during the sixth week of the semester, with the same outcome measures discussed above. The treatment group reported lower levels of anxiety and stress, and increased levels of sleep quality and energy. The control group, in contrast, reported higher levels of anxiety and stress, and decreased levels of sleep quality and energy. The results suggest aroma inhalation may reduce stress among college students. Further research is warranted.

## INTRODUCTION

Stress is defined as a physical or perceived threat to homeostasis (Qi, et al., 2016). Short-term stress is associated with elevated heart rate and blood pressure, gastric upset, headaches, heart attacks, arrhythmias, and even sudden death (American Psychological Association, 2013). Chronic stress is associated with difficulty concentrating, irritability, fatigue, heart disease, an increase in unhealthy behaviors such as smoking and disordered eating, depression and low levels of social support (American Psychological Association, 2013). College students are especially prone to experiencing high levels of stress, both short-term and long-term. Transitioning to a new lifestyle, financial concerns, demanding academics, relationships, future career plans and new social opportunities are just a few of the stressors college students face. Research reveals that as stress increases, life satisfaction among college students decreases (Holinka, 2015).

The target population of this study is freshman females at the University of Montana. Stress among this demographic is incredibly prevalent at the University of Montana. According to the 2014 American College Health Association National College Health Assessment II, 30% of freshman females at the University of Montana report an average level of stress, 57.1% report a more than average level of stress and 12.9% report a tremendous level of stress in the last 12 months. Additionally, 31.4% of UM freshman females report earning a lower grade on an exam or project due to stress (ACHA-NCHA II, 2014). Reducing stress among college students is fundamental to improving health, wellness and academic performance.

Aromatherapy is defined as the therapeutic use of essential oils extracted from plants (Ernst E., 2005). Aromatherapy is a popular form of alternative therapy used for a wide variety of ailments, and is especially popular for its non-invasive and accessible nature (Chen, Fang, & Fang, 2015). Through aroma inhalation, aromatic molecules pass through the lining of the nasal cavity. These aromatic molecules have the ability to affect the hypothalamus, autonomic nervous system and endocrine system. These molecules can decrease stress, promote blood circulation, regulate heart rate and blood pressure, and improve hormonal coordination (Huang, Fang, & Fang, 2014). Research also suggests aroma inhalation can reduce the level of perceived burnout and fatigue, both of which are commonly associated with stress (Varney & Buckle, 2013).

This study aimed to determine the efficacy of aromatherapy for stress reduction among students at the University of Montana. The study included a pre-survey for the treatment and control groups, two intervention meetings for the treatment group, and a post-survey for the treatment and control groups. The intervention was aroma inhalation of three essential oils: lavender, clary sage and chamomile. These oils were chosen for their chemical properties and potential ability to reduce stress. Lavender and clary sage oils contain linalyl acetate. Linalyl acetate has been shown to decrease blood pressure, heart rate and respiratory rate, and decrease salivary cortisol and CgA concentrations (Seol et al., 2013; Toda & Morimoto, 2008). Research has also revealed that lavender and clary sage oils act on neurotransmitters in the brain. Lavender oil increases the effects of  $\gamma$ -aminobutyric acid, an inhibitory neurotransmitter, and clary sage oil activates dopamine pathways (Seol et al., 2013). Chamomile has been shown to reduce anxiety and depression, which are both common side effects of stress. Chamomile contains flavonoids that seem to modulate noradrenalin, serotonin, dopamine, and  $\gamma$ -amino butyric acid neurotransmission, as well as hypothalamic-pituitary-adrenocortical axis activity (Amsterdam et al., 2012). As research suggests, aroma inhalation may provide college students with a natural and straightforward method to reduce stress.

## **METHODS**

### *Subjects*

As assigned by the residence life director, subjects residing in Aber Hall floors 6 and 7 participated in this study. A total of 10 subjects finished the study. Subjects residing on floor 6 served as the control group and subjects residing on floor 7 served as the treatment group. The treatment and control groups each had five participants. The details and procedures of the study were explained to subjects. A verbal consent script was read and signed informed consent was received from each subject prior to the study.

### *Surveys*

Subjects in the treatment and control groups were administered a pre-survey during the first week of the semester. The outcome measures were rated on a 1-10 scale, with 1 being the lowest and 10 being the highest level of stress, anxiety, energy, sleep quality, and muscle tension, aches, or stiffness. During the sixth week of the semester, the treatment and control groups were administered a post-survey with the same outcome measures as the pre-survey. On both surveys, subjects were asked to record a unique identifier, comprised of the last three digits of their student identification number followed by the last two digits of their cell phone number. The unique identifier allowed for confidentiality and anonymity in survey responses. Responses were recorded in an Excel spreadsheet.

### *Essential oil compounds*

Three essential oils were used in the study. These oils included clary sage, chamomile and lavender. These oils were chosen based on their therapeutic properties and potential to reduce stress, as discussed in the introduction. Each essential oil was pre-mixed with jojoba oil, a carrier oil, at a 10% dilution using a 5mL pipette into 15 mL drams. Each dram was labeled and dated.

### *Intervention - Aroma Inhalation*

Subjects in the treatment group participated in a two-part intervention. The first intervention occurred one week following the pre-survey. During this meeting, information was given on the history of aromatherapy, the therapeutic uses of aromatherapy, the application of aromatherapy as a stress reduction tool, and the therapeutic value of the three oils being used. Subjects then picked one of the three pre-mixed oils and applied the oil on their wrists for a guided aroma inhalation. Subjects were instructed to use their oil twice a day for the next week by dropping several drops onto the wrist for aroma inhalation.

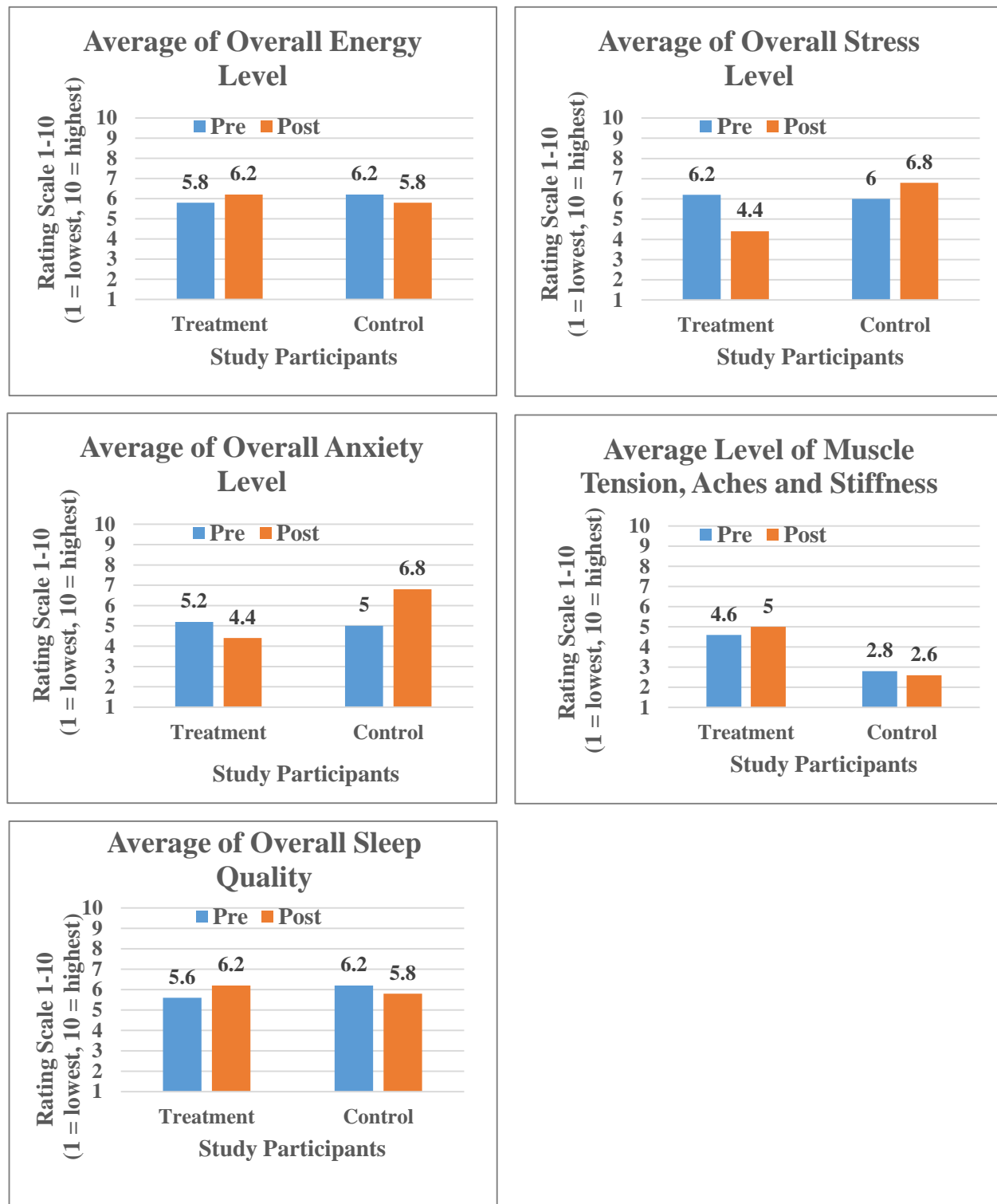
One week later, subjects met for intervention day two. Information was given on the most commonly used essential oils in aromatherapy, where to buy essential oils and carrier oils, and the importance of buying quality oils. Subjects were given the opportunity to pick a second dram and applied the oil on their wrists for a guided aroma inhalation. Subjects were instructed to continue using their oil twice a day for the next three weeks by dropping several drops onto the wrist for aroma inhalation.

## RESULTS

Data were entered into an Excel spreadsheet. Between-group comparison was conducted on the treatment and control groups by taking an average of the individual pre-survey and post-survey responses. See results in *Figure 1*. Responses were recorded on a 1-10 scale, with 1 being the lowest and 10 being the highest level of stress, anxiety, energy, sleep quality, and muscle tension, aches, or stiffness.

The overall stress level of the treatment group decreased by 1.8, and increased by 0.8 for the control group. The overall anxiety level for the treatment group decreased by 1.0 and increased by 1.8 for the control group. The overall sleep quality for the treatment group increased by 0.6 and decreased by 0.4 for the control group. The overall energy level for the treatment group increased by 0.4 and decreased by 0.4 for the control group. The level of muscle tension, aches, or stiffness for the treatment group increased by 0.4 and decreased by 0.2 for the control group. This increase in muscle tension, aches, or stiffness in the treatment group is not surprising, as one of the treatment subjects reported an illness in her family has required her to drive 1.5-2 hours per day to provide care. These results suggest that aromatherapy is effective in reducing stress.

Figure 1. Between-group comparison of pre-survey and post-survey data for the treatment and control groups. Responses were rated on a 1-10 scale, with 1 being the lowest and 10 being the highest.



### *Limitations*

This was a small study with only 10 participants. Although the results were promising, the study had several limitations. First, all of the participants were freshman females at the University of Montana. The original intention of the research was to have a larger sample size with all genders, but the study design was limited by access to subjects through the residence life director. Another limitation is that some participants did not use their essential oil twice per day for the duration of the study. Several participants reported that they forgot to use the essential oil as directed. Another limitation to the study is the chance that subjects either stopped or started taking medications throughout the study. One subject in the treatment group noted on their post-survey that they started taking a new medication during the study. The final limitation to discuss is the fact that the treatment group was educated on the therapeutic value of essential oils. Background information on essential oils was given to the treatment group to ensure proper handling and safety precautions and to educate subjects on the therapeutic value of essential oils. This information may have affected the post-survey responses. The study results cannot be generalized to the University of Montana campus at large, nor can they be generalized to the public. Future studies are warranted.

### **DISCUSSION**

The study findings are promising. The survey results coincide with the hypothesis that aromatherapy is effective in reducing stress among college students, as the treatment group reported lower levels of stress and anxiety and higher levels of sleep quality and energy. These results were especially surprising, as the post survey was administered during the sixth week of the spring semester. At this time in the semester, stress and anxiety levels on college campuses are typically rising, as midterm examinations and paper deadlines approach.

Furthermore, survey data revealed that 60% of subjects in the treatment and control groups reported feeling too fatigued to engage in academic, work-related, or social activities in the past week. Survey data also revealed that 60% of subjects in the treatment and control groups struggled with concentration or memory in the past week. These data emphasize the necessity to address and manage stress among college students. Four of the treatment subjects reported aromatherapy is a tool they will continue to use (one subject did not answer this question). Aromatherapy is a promising resource for reducing stress among college students.

### **ACKNOWLEDGEMENTS**

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