

The Effect of Aromatherapy on Anxiety Experienced by Hospital Nurses

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Aromatherapy has been defined as the therapeutic use of essential oils to promote or improve health, hygiene, and well-being (Tisserand & Yong, 2014). As the therapeutic use of essential oils from herbs, flowers, and other plants (Buckle, 2015a), aromatherapy has been investigated for potential health benefits in many patient populations. Oils extracted from fragrant plants have been used since ancient times to promote health and treat physical ailments. According to a model of the physiologic effect of aromatherapy proposed by Chen, Fang, and Fang (2015), this process stimulates chemoreceptors in the nose that trigger electrical impulses sent to the amygdala and limbic system of the brain. These are associated with behaviors related to memory, mood, emotions, and anxiety. A number of essential oils, especially citrus-based oils such as bergamot, lemon, and orange, are classified in a psychoaroma therapeutic group, and are recommended commonly by aromatherapists to relieve anxiety and stress, and elevate mood. Although aromatherapy generally is associated with positive responses, therapeutic effects have not been supported well (Lee, Choi, Pasadzki, & Ernst, 2012).

Significance

Hospital nursing requires a high level of cognitive, physical, and emotional ability and stamina. It also has been associated with high levels of occupational stress; only

Environmental stress management for hospital nurses is a complex and dynamic challenge that can affect professional practice, employee wellness, teamwork effectiveness, and patient safety and outcomes. The results of this study failed to demonstrate occupational exposure to aromatherapy was associated with a decrease in hospital nurse anxiety.

low-quality evidence suggests cognitive-behavioral training, relaxation techniques (e.g., massage, mindfulness), and changes to workplace conditions result in decreased stress (Ruotsalainen, Verbeek, Mariné, & Serra, 2014). Many hospital nurses work 12-hour shifts and are at risk for poor inter-shift recovery resulting in acute and chronic fatigue (Chen, Davis, Daraiseh, Pan, & Davis, 2013). Psychological job demands are related significantly to occupational fatigue among nurses working 12-hour shifts (Han, Trinkliff, & Geiger-Brown, 2014).

The American Psychological Association (2015) defined *anxiety* as “an intense emotional response caused by the preconscious recognition that a repressed conflict is about to emerge into consciousness.” *Stress* is defined as “the pattern of specific and nonspecific responses an organism makes to stimulus events that disturb its equilibrium and tax or exceed its ability to cope.” Symptoms of occupational stress and anxiety among nurses may have a negative effect on or have negative consequences for their physical and psychological health, and it is impor-

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Introduction

Hospital nursing is associated with high levels of work-related stress and anxiety. Alleviation of environmental stressors may be an important indicator of a healthy work environment.

Purpose

The purpose of this study was to evaluate changes in hospital nurse anxiety scores associated with exposure to workplace aromatherapy using a blend of essential oils.

Method

The study was conducted on a 34-bed orthopedic surgical trauma unit at a Level II trauma center in southern California. Nurse anxiety was measured during a 2-week period before the intervention of aromatherapy, then during the following 2 weeks while the intervention was implemented on the nursing unit. Pre- and post-intervention differences in average hospital nurse anxiety scores were compared to investigate the effect of an essential oil aromatherapy blend administered using an electronic atomizing diffuser. Nurse anxiety was measured using the State Trait Anxiety Inventory Form Y (STAI Y-1), a 20-item questionnaire which measured an individual nurse's emotional state response to a stressful situation and emotional response to worry, nervousness, tension, and apprehension.

Findings

Study results failed to demonstrate occupational exposure to aromatherapy was associated with a decrease in hospital nurse anxiety. There was no significant difference between the average baseline anxiety score and anxiety score during the aromatherapy intervention.

Conclusion

The results of this study indicated hospital nurses working on an orthopedic surgical trauma unit reported low to moderate anxiety scores and did not experience significant reduction in anxiety when exposed to aromatherapy. Despite the lack of conclusive findings to support the anxiolytic effect of aromatherapy, investigators observed an overall positive attitude toward the use of aromatherapy on the nursing unit.

agement, complementary medicine, alternative medicine, bergamot oil, orange oil, lemon, and chamomile. Inclusion criteria were peer-reviewed nursing articles published in English. Search dates initially were 2010-2015, but the limited studies prompted an expanded search (2007-2015).

Cooke, Holzhauser, Jones, Davis, and Finucane (2007) assessed use of aromatherapy massage and music to decrease occupational stress and anxiety among nurses in the Emergency Department of a large tertiary hospital. Aromatherapy massage with New Age music was used during work time. Participants chose a preferred essential oil for the massage (rose, lavender, lime, ocean breeze [lavender, ylang ylang, bergamot, patchouli]). Nurse work stress was measured before and after the 12-week study period using the Perceived Occupational Stress Scale. Anxiety also was assessed before and after each massage using the Faces Anxiety Scale. Authors found reduced nurse anxiety scores following aromatherapy massage and music intervention. Although pre-intervention nurse anxiety was slightly higher in winter than in summer, post-intervention anxiety was similar regardless of the season; this indicated the intervention had a similar effect regardless of pre-intervention anxiety.

Pemberton and Turpin (2008) studied the effect of inhaling lavender and clary sage oils on work-related stress in 14 intensive care nurses over 42 worked shifts. They compared the effect of a non-aromatherapy sweet almond oil to an aromatherapy with essential oils on nurses' work-related stress. Work-related stress was measured using a 10-point scale logging three shifts of scores. More nurses using true lavender/clary sage aromatherapy (57.1%, $n=8$) reported decreased stress compared to 21.4% ($n=3$) of nurses using sweet almond oils in the control group. Five nurses reported high stress scores (8) before aromatherapy and two of them reported only a minor reduction of stress score to 7, indicating a lack of efficacy at higher stress levels.

tant to involve nurses in identifying initiatives aimed at reducing the effects of occupational stress (Happell et al., 2013). Nurses' exposure to stress can negatively impact caring behaviors as well as their own health-related quality of life (Sarafis et al., 2016). Nurses should be encouraged to participate in self-care techniques and determine which interventions are personally effective (Crane & Ward, 2016). Aromatherapy may contribute to a healthy work environment and decrease nurse anxiety associated with occupational stress.

Purpose

The purpose of this study was to evaluate the use of aromatherapy as an intervention to reduce occupational stress among registered nurses on an orthopedic surgical trauma unit.

Literature Review

CINAHL, Medline, PubMed, and Google Scholar were searched using key terms *aromatherapy* and *nurse anxiety*. Related search terms used were *occupational stress*, *stress man-*

Investigators recommended future research include larger samples and to evaluate higher doses of aromatherapy for nurses reporting greater stress.

Shimada and colleagues (2011) investigated lavender oil aromatherapy use by 11 physicians and eight technicians. The essential oil of lavender was inhaled for 30 minutes while measuring flow-mediated dilation of the brachial artery before and after a regular work day and after working the night shift. This process was performed with the same subjects using a 30-minute rest without aromatherapy as the control. Researchers reported impaired endothelial function associated with cardiovascular risk factors was alleviated following 30 minutes of aromatherapy when compared to the control group.

McBride and Sturges (2012) reported emergency nurses at Vanderbilt University Medical Center experienced decreased work-related stress and increased energy when using diffused essential oils for 30 days. Additionally, a majority of the surveyed emergency room staff (94%) agreed diffusing essential oils on the nursing unit contributed to a more positive working environment. Following the study, Emergency Department nurses continued to use essential oils for more than 2 years without any reported adverse reactions.

Chen and co-authors (2013) studied the effect of inhaling lavender oil on nurses' symptoms of job stress. In the experimental group, 53 nurses attached small bottles containing 3% lavender oil to their clothes at the right chest area; 57 nurses in the control group had empty bottles without lavender oil attached to the same body area. Researchers developed a stress symptom questionnaire consisting of 23 stress symptoms and participants were directed to circle their stress-related symptoms at the end of their shifts during the study period. The content validity rating of the questionnaire was 0.92 and the Chronbach's α for stress symptoms was 0.88. Nurses in the experimental group reported a reduction in stress after 3 days of aromatherapy from

6.1 to 3.1 in the experimental group, while nurses in the control group reported a slight increase in stress symptoms from 5.6 to 5.7 ($p < 0.05$).

Essential oils have been used in combination with chamomile, which is known for having a calming effect (Pounds & Cooksley, 2014). Sweet orange aroma has demonstrated anti-anxiety effect that was not followed by physical or mental sedation (Goes, Antunes, Alves, & Teixeira, 2012). The use of aromatherapy has been associated with anti-anxiolytic effects among healthcare professionals in occupational settings. Aromatherapy has been associated generally with positive therapeutic responses and publications demonstrate an interest in aromatherapy as a method to reduce work-related stress for hospital staff (Buckle, 2015b). Although risks associated with aromatherapy are scant and costs are minimal, aromatherapy is a relatively unexplored strategy to alleviate work-related stress among nurses in a hospital setting.

Methodology

Sample

Registered nurses who worked day and/or night shift on a 34-bed orthopedic surgical trauma unit at a Level II Trauma Center in southern California were recruited to participate in the study. A convenience sample of 44 nurses (80% of the 56 nurses working on the study unit) typically worked three 12-hour shifts each week and did not rotate between shifts. Several nurses who were familiar with use of essential oils and aromatherapy in their home settings were asked by the clinical nurse specialist (CNS) and nurse manager to sample various blends of the essential oils several weeks before the study, prompting an interest to evaluate the effect of aromatherapy on nurse anxiety. Small plastic nasal inhalers were used for this purpose, each containing various combinations of the same citrus and cape chamomile oils used in this study. The final blend was determined by the hospi-

tal's aromatherapist, and the study was initiated 2 months later.

Design

A quasi-experimental, nonrandomized design was used for the study. The hospital Institutional Review Board approved the study. To minimize the potential risk of respiratory sensitivity associated with aromatherapy, an aromatherapy consultant blended oils considered to have a low allergic impact. Citrus essential oils were recommended due to their nontoxicity and lack of known side effects. Cape chamomile was reported to have a small potential for inducing allergic reactions and did not have other contraindications associated with its use (Tisserand & Yong, 2014). The aromatherapy used for this study included cape chamomile (*Eriocephalus punctulatus*), bergamot (*Citrus aurantium*), lemon (*Citrus limon*), and sweet orange (*Citrus sinensis*) essential oils blended by a certified clinical aromatherapist employed at the study site. The aromatherapist, who served as a consultant for this study, recommended the blend because of potential beneficial anxiolytic effects and lack of known negative effects on mental or physical capacity.

Nurse anxiety was measured using the State Trait Anxiety Inventory Form Y (STAI Y-1), a 20-item questionnaire used to measure a person's emotional state response to a stressful situation and emotional response to worry, nervousness, tension, and apprehension (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). All study participants completed the STAI Y-1 before and during the intervention. Differences in nurse group mean anxiety scores before and after the intervention were compared to investigate the effect of an essential oil aromatherapy blend administered using an electronic atomizing diffuser. The study was conducted while nurses were working on the unit from 9:00 a.m. to 5:00 p.m. or 9:00 p.m. to 5:00 a.m. to avoid change of shift disruptions during March-April 2014. Nurses were asked to complete the study questionnaire without interruption

TABLE 1.
Comparison of State Anxiety Scores

Registered Nurses	Pre-Test Scores			Post-Test Scores			Sig.
	N	\bar{x}	SD	N	\bar{x}	SD	
Day shift	28	36.35	10.32	30	36.80	9.66	
Night shift	16	35.62	8.26	14	36.07	11.24	
Total	44	36.09	9.53	44	35.56	10.06	0.09

at a location 1-10 feet from the nurses' station where the oil blend was being diffused. Investigators did not interact with nurses during patient care and avoided contact with nurses during times of increased workload.

Aromatherapy was diffused using an electronic atomizing diffuser (Aroma-Ace™). The diffuser had a timer that could be set for up to 3 hours with saturation controls that enabled the nurse to select the intensity of the essential oil blend. A bottle containing the blend was connected directly to the diffuser. Two electronic diffusers were placed on opposite ends of the study unit between two nursing stations that were approximately 125 feet apart and were run continuously to maximize the scent saturation of the air during day and night shifts.

Instruments

Nurse anxiety was measured using the STAI Y-1. The measure of stress was related to how an individual nurse felt in the moment ("right now"). The STAI Y-1 had 10 positively worded items (e.g., "calm") and 10 negatively worded items (e.g., "tense"). Each item was scored using a 4-point scale (1=*not at all*, 2=*somewhat*, 3=*moderately*, 4=*very much*). To create a possible total score of all items (20-80, with greater scores indicating more anxiety), the 4-point scale was reversed for negatively worded items. Internal consistency coefficients for the STAI Y-1 have been reported in the range of 0.86-0.95 (Spielberger et al., 1983). Test-retest coefficients have been reported at 0.69-0.89, indicating strong evidence of construct and concurrent validity (Spielberger, 1989).

Procedure for Data Collection

Each questionnaire was administered using a pen-and-paper format and required approximately 3-4 minutes to complete. The pre-test and post-test questionnaires contained 20 items from the STAI-Y-1 as well as a question regarding shift worked. The post-test questionnaire included a *Comment* section for anonymous open-ended responses. All study materials, including a participant information sheet and study questionnaires, were distributed to and collected from nurses by the primary investigator, the unit CNS, or one of two co-investigator clinical nurses. Pre-test questionnaires were distributed over 2 weeks before administration of the aromatherapy intervention. Post-test questionnaires were administered over 2 weeks during the aromatherapy intervention on the nursing unit.

Information about the anonymity of the questionnaire results and instructions on what to do in the event of side effects from the aromatherapy was given in written form to each nurse participant. The information also disclosed cape chamomile may cause allergic reactions by including the statement, "Individuals who are sensitive to ragweed, chrysanthemums, and daisies may experience allergies or hay fever type symptoms" (National Institutes of Health, 2012).

Nurses were informed they could choose not to participate in the study at any time. All nurses were asked to stop the aromatherapy if at any time anyone requested discontinuation (e.g., nurses, other hospital employees, patients, or guests). After completing the questionnaire,

participants were asked to fold and place it in a manila envelope to assure anonymity. Written responses from the questionnaire were entered into an SPSS version 21 database for statistical analysis by the nurse research scientist. Group mean pre-test and post-test scores were compared for statistical significance using the Student's *t*-test and analysis of variance.

Results

Forty-four registered nurses completed the pre-test questionnaire and 44 registered nurses completed the post-test questionnaire (see Table 1). The study was limited to a 2-week intervention period, and all registered nurses (*n*=44) who worked during that time participated in the study. Post-test questionnaire comments indicated most nurses (*n*=38) liked the aromatherapy and were glad to participate in the study. However, three nurses noted preference for other aromatherapy scents; two nurses disliked the aromatherapy because the scent was too strong, and one nurse stated the aromatherapy caused headache and nausea. Aromatherapy was discontinued for 1 day following the nurse complaint of headache and nausea.

The pre-test and post-test anxiety scores for day and night shifts, and for all nurses are listed in Table 1. No significant differences were found between mean pre-test and post-test anxiety scores, which indicated mild anxiety. Range of scores was very similar for pre-test anxiety (20-61) and post-test anxiety (20-59). Individual items of the STAI Y-1 were evaluated for pre-test and post-test differences (see Tables 2 &

TABLE 2.
Comparison of Positive Item Anxiety Scores

State Anxiety Item	Pre-Test Scores (n=44)		Post-Test Scores (n=44)		Sig.
	\bar{x}	SD	\bar{x}	SD	
Relaxed	2.70	0.88	2.56	0.92	0.89
At ease	2.51	0.90	2.45	1.04	0.21
Content	2.34	0.90	2.38	0.89	0.71
Calm	2.31	0.80	2.25	0.89	0.27
Satisfied	2.27	0.77	2.34	0.88	0.36
Comfortable	2.18	0.86	2.13	0.92	0.92
Pleasant	2.06	0.82	2.18	0.84	0.49
Steady	2.02	1.03	2.11	1.01	0.16
Secure	1.90	0.81	1.97	0.79	0.97
Confident	1.77	0.65	1.97	0.99	0.51

TABLE 3.
Comparison of Negative Item Anxiety Scores

State Anxiety Item	Pre-Test Scores (n=44)		Post-Test Scores (n=44)		Sig.
	\bar{x}	SD	\bar{x}	SD	
Strained	1.77	1.03	1.97	0.97	0.27
Tense	1.70	0.98	1.81	0.94	0.04*
Misfortune	1.70	0.90	1.59	0.94	0.88
Worried	1.52	0.73	1.54	0.72	0.39
Nervous	1.34	0.60	1.31	0.67	0.30
Upset	1.27	0.66	1.29	0.59	0.29
Indecisive	1.25	0.53	1.29	0.63	0.78
Frightened	1.18	0.55	1.00	0.00	
Jittery	1.15	0.42	1.22	0.47	0.46
Confused	1.09	0.36	1.11	0.53	0.93

* $p < 0.05$

3). One of the anxiety items (*tense*) demonstrated significant differences between the pre-test and post-test item scores ($p < 0.05$).

Individual anxiety item scores in Tables 2 and 3 demonstrated a trend for higher mean anxiety scores for positively worded items compared to negatively worded items. In calculation of a total anxiety score, positively worded items were reverse-scored and added to negatively worded item scores. Nurses reported the highest mean score for anxiety (2.7), a score representing

feeling *moderately so* about anxiety (not feeling relaxed, at ease, content, or calm). Nurses reported the least anxiety about feeling indecisive, frightened, jittery, or confused (mean 1.09, *not at all*).

Discussion

Concerns about the lack of significant effect of aromatherapy on anxiety have been reported in two systematic reviews (Hur, Song, Lee, & Lee, 2014; Yuk-Lan, Ying, Tsang, Leung, & Cheung, 2011). Investi-

gators in the current study chose not to measure nurse stress during busy work times or known stressful occupational events. Although nurses work in stressful environments, the STAI Y-1 scores in this study indicated average nurse anxiety was consistently mild. Although nurses consistently completed the pre-test and post-test proximate to the aromatherapy diffusion, there was no method to measure aromatherapy exposure. Because variation in nurse exposure to aromatherapy was not measured, a dose-related effect could not be measured.

A comparison of pre-test and post-test group mean anxiety scores failed to demonstrate occupational exposure to aromatherapy was associated with a decrease in nurse anxiety. Individual anxiety item scores clearly demonstrated nurses were more likely to rate anxiety higher for positively worded items and score anxiety lower for negatively worded items. This trend might reflect nurse reluctance to identify with negative concepts and a willingness to identify with a need for improvement in positive states.

Limitations

This study was limited by use of a quasi-experimental design with a small convenience sample in a single hospital unit. Not all nurses exposed to the aromatherapy completed the pre-test and post-test questionnaires and a control group unexposed to aromatherapy was not used. Individual questionnaires also were not coded. Timing of the measurement of occupational stress during a break from routine work and not proximate to stressful events may have contributed to lower anxiety scores and lack of significant findings associated with aromatherapy exposure. Without matched analyses, trends in individual anxiety score differences could not be measured.

Recommendations for Future Research

Continued investigation of occupational stress-reduction interven-

tions for nurses is recommended. Comparison of several types of aromatherapy blends with methods that measure individual aromatherapy exposure also is suggested. Timing of the measurement of nurse anxiety proximate to stressful events, use of additional measures of perceived stress, and objective measurement of biomarkers may be helpful to clarify the effect of aromatherapy on anxiety experienced by nurses. Future research also is indicated to monitor and detect times when nurse anxiety and stress become moderate to high and evaluate the effect of practice environment interventions using an experimental design.

Nursing Implications

Designing studies to evaluate interventions to alleviate environmental stressors is an important strategy to empower nurses to understand and create a healthy practice environment. Although aromatherapy has been associated with stress reduction (Hur et al., 2014), the well-planned aromatherapy intervention tested in this study was not associated with changes in nurse anxiety scores. Results of the study were shared with nurse participants who were engaged in the study outcomes and wished to consider the study implications. Because of the scientific approach, investigators were able to review survey results with objective outcomes indicating stability in state anxiety nurse scores before and after exposure to aromatherapy. They encouraged other hospital nurses to test aromatherapy exposure and compare changes in anxiety and stress scores.

Conclusion

Environmental stress management for hospital nurses offers a complex and dynamic challenge that can affect professional practice, employee wellness, teamwork effectiveness, and patient safety and outcomes (Milliken, Clements, & Tillman, 2007). Results of this study indicated nurses on an orthopedic

surgical trauma unit reported low-to-moderate anxiety scores and did not experience significant reductions in anxiety when exposed to aromatherapy. However, a systematic review and meta-analysis of the effectiveness of aromatherapy for stress management suggests aroma inhalation may be effective in reducing self-reported stress (Hur et al., 2014). Aromatherapy may be an underused occupational stress management strategy for nurses in hospital settings. **MSN**

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