The Effect of Essential Oils on Work-Related Stress in Intensive Care Unit Nurses

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This small pilot study evaluated the effect of a topical application of the essential oils *Lavandula angustifolia* and *Salvia sclaria* on work-related stress of nurses in an ICU setting. Results demonstrated decreased perception of stress level in the intervention group during three 12-hour worked shifts. **KEY WORDS:** *acute care work environment, aromatherapy, essential oils, Lavandula angustifolia, Salvia sclaria, work-related stress*

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Occupational stress is documented as a major factor that leads to decreased productivity, morale, and burnout of nurses in practice.[1] The routine daily caring for critically ill patients, participating with families in end-of-life decisions, resuscitative efforts, deaths, and interrelationships with coworkers are basic factors that add to everyday stress in the life of a nurse in the intensive care environment.[2]

The purpose of this small, quasi-experimental pilot study was to assess the effects of the topical application of a combination of the essential oils of *Lavandula angustifolia* (true lavender) and *Salvia sclaria* (clary sage), mixed in a carrier oil containing sweet almond oil, on work-related stress on nurses in the medical-surgical intensive care unit (MSICU).

BACKGROUND

The nursing shortage exists worldwide and affects all areas of nursing.[3] The American Association of Colleges of Nursing documented that there would be a shortage of 340 000 registered nurses by 2020.[4] Work environments with low satisfaction in nursing can increase nurses' intent to leave their current positions.[5] Stress was one of the highest variables listed that affects nurses' job satisfaction.[6] As nurses experienced an increase in stress levels, perceived nursing satisfaction decreased.[7] Reducing the levels of stress in intensive care unit (ICU), nurses may have an impact on nurse retention and shortage.

Selye suggested that stress is "the non specific response of the body to any demand made upon it."[8(p24)] Harris[9] indicated that employees in health-related professions experience more stress than workers in other occupations. Stress, as it applies to nursing, is a positive or negative response to an occurrence that can affect physical, psychological, behavioral, and overall sense of well-being.[2] Feits and Romeo[10] noted that studies of the earliest ICUs in the 1950s identified occupational stressors in acute care nurses. ICU nurses seem to experience the same types of stress over time.[10] High sickness and absentee rates in nursing are a major factor related to occupational stress.[1] Lindquist et al stated, "stress may have particular adverse psychological and physiologic effects on nurses who are assigned 8–12 hour shifts on the unit with the responsibility to care for patients who are desperately ill."[11(p393)]

The MSICU at this large, urban acute care hospital in the southwest United States has 22 beds and a staff of 63 registered nurses. The nurses have consistently verbalized concerns about how to deal with stress and have looked for ways to reduce it at work. One method employed has been to invite pastoral care services to visit staff at the end of shifts for prayer and reflection. Chair massages and relaxation techniques, including M-Technique, music therapy, and aromatherapy, have also been strategies used to relieve stress.

Aromatherapy uses essential oils as a complementary method for healing and therapeutic

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benefits.[12] The chemical composition of essential oils has proven to have healing properties through scientific research.[12] Topical and inhalation methods of aromatherapy are used to treat a wide range of ailments.

This study used the combination of the essential oils *L angustifolia* and *S sclaria*. Researchers have documented that *L angustifolia* calms stress and anxiety and is safe.[13,14] Dunn et al used *L angustifolia* and found that "the odor of lavender may have a sedative effect on brain wave patterns and so is likely to be particularly useful in stressful circumstances such as in intensive care setting."[15(p36)] Other researchers used lavender to reduce stress on orthopedic and emergency nurses.[16,17] Another group used lavender to reduce stress in intensive care patients,[14] but most articles suggested the use of aromatherapy for general stress reduction.

S sclaria has been listed for clinical applications to be very relaxing and to have known calming effects.[12] Seo and Park[18] used *S sclaria* by inhalation to reduce stress in middle-aged women. *S sclaria* and *L angustifolia* contain esters that have endocrine balancing and nervous system restoring properties, which facilitate combining for therapeutic applications.[19] Park and Lee[20] used these 2 essential oils, via inhalation, on the stress response of nursing students, which resulted in lower stress scores.

METHODS

Design

This quasi-experimental pilot study used a pre-post design, with 14 participants, each serving as his or her own control. Nurses in the MSICU who worked in either the day or night shift were invited to participate by the primary investigator (PI). If they met the inclusion criteria, participants were provided informed consent and invited to sign and participate in the study. There was minimal deception in that the participants did not know which combination of oils was formulated to reduce stress. Although there was no requirement for participants to provide anecdotal comments, several participants elected to explain their responses to the PI.

Sample

The study used a convenience sample from the registered nurses assigned to the MSICU.

Inclusion criteria were nurses from MSICU day or night shifts, willing to sign informed consent, capable of following directions to use the applications, and must work three 12-hour shifts per week with full-time status.

Exclusion criteria were nurses who were pregnant, allergic to nuts, had known estrogen-related cancer, or those who showed irritation/sensitivity to a patch test.

Although it has been noted that *L angustifolia* is safe to use,[13,14] *S sclaria* has special precautions related to estrogen-related cancer[12] that were specified in the study exclusion criteria. Sweet almond oil was selected as the carrier oil, so participants were informed that they must not have an allergy to nuts. After informed consent was given, the PI performed a patch test on each participant to determine irritation/sensitivity to the applications being used. The patch test was first a 6% solution of *L angustifolia* in sweet almond oil and then a 4% solution of *S sclaria* in sweet almond oil. This was applied to each participant to the inner aspect of his or her arm. The 2 separate areas were covered with a cotton ball and a Band-Aid. These were left on the skin for 12 hours. Each participant was given instructions to not wash off the patch test oils or remove the dressings before 12 hours. Instructions were given that if redness or irritation occurred, remove the dressing, rinse with milk, and then wash with soap and water. Instructions also included that coffee grounds could be used to neutralize the smell, if it was an irritating aroma to the participant. When dressings were removed after 12 hours and no redness was visualized, those having no reaction to the oils were given the opportunity to participate and informed that they could withdraw from the study at any time, without penalty. Consents were signed by 14 (40%) of the 35 nurses that met inclusion criteria.

Ethical considerations

The hospital institutional review board approved this study. Each consent form described what the study involved and that there were no known risks or side effects. This study had no financial benefit to any one involved, nor was any participant responsible for any cost.

Data collection

This study took place at the MSICU from January 14, 2007, to February 10, 2007. Each participant was given 2 applications to use, labeled application #1 and

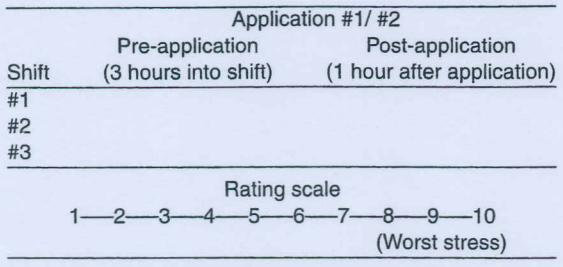

FIGURE 1. Stress level log sheet.

application #2. Application #1 was only the carrier oil of sweet almond oil and application #2 was a 5% solution of the essential oils of *L angustifolia* (3%) and *S sclaria* (2%) in a carrier oil of sweet almond oil. The PI purchased thirty 4-oz amber glass dropper bottles from a local health food store at a reasonable cost. The essential oils and carrier oil were purchased through an online aromatherapy carrier. Through experience of the usual workflow of this unit, it was determined that applications of the oils over 3 shifts would give the participants the opportunity to experience variations of perceived stress. Each nurse was instructed to use application #1 during three 12-hour worked shifts, within 2 weeks or 6 shifts. Each participant was given application #1 in an amber glass dropper bottle, an instruction sheet, a stress level log sheet (see Figure 1) labeled application #1, and a plain white envelope.

Each participant was given specific written instructions on how to use the stress level log sheet, which included markings for a range of 1 to 10, to document his or her level of stress. The instructions specified that only whole numbers were to be identified. For example, if the participant felt that his or her stress was between 3 and 4, a decision needed to be made to mark either 3 or 4, not 3.5. The value of 1 was no stress, 5 was medium stress, and 10 was the worst stress the participant experienced.

Instructions were to assess stress level on a 1 to 10 rating scale 3 hours after the shift began and document this rating on the log sheet for the applicable shift (1, 2, 3). (This application time was selected because the number of physician visits, patient transports for special procedures, admissions, family visits, and medication administration increased during this time on this unit.) The participants applied 5 drops of application #1 to the inner aspect of the forearm and rubbed it together with the opposite arm. Directions were given to apply the oil high enough on the arm to avoid the application from being washed off with frequent hand washings. Each participant was instructed not to apply any substances, such as lotions or creams, other than supplied applications to skin during the study time.

One hour after application of the oil, participants were instructed to again assess the stress level on the 1 to 10 rating scale and document it on the area of the log sheet labeled post-application for the appropriate shift. At the end of the third 12-hour shift, participants were instructed to complete documentation of stress levels, place the log sheet in the provided white envelope, seal the envelope, and place it in the unit mailbox of the PI.

Once all log sheets for application #1 were received, application #2 was provided to each participant in a separate amber colored glass dropper bottle along with instructions, stress level log sheet (Figure 1) labeled application #2, and another plain white envelope. During the second set of three 12-hour shifts worked, the participants followed the procedure described above, placed the completed log sheet in the envelope provided, and placed it in the PI's mailbox.

Data analysis

The stress level scores from the logs of all participants were entered into spreadsheets in Excel for analysis. Each participant's scores were grouped by shift 1, 2, and 3, respectively. This enabled the PI to look for trends of increased or decreased stress among applications. Charts were developed to illustrate the individual scores for each participant for each application. Letters A through N were assigned to represent each participant in the control and intervention groups. These charts are presented as Figures 2 and 3. As an example to interpret the charts, participant A in Figure 2 (control group) on the first shift scored 3 for the pre-application and 2 for post-application; on the second shift, marked 2 for pre-application and 1 for post-application; and for shift 3, marked 1 for the pre-application and 2 for the post-application.

The pre-application and post-application median scores for each participant were calculated to demonstrate decrease or increase in stress across the 3 shifts. Graphic representation of the median scores is presented in Figures 4 and 5.

RESULTS

Figures 2 and 3 illustrate each participant and his or her pre-application and post-application stress levels for all 3 shifts for application #1 (control) and

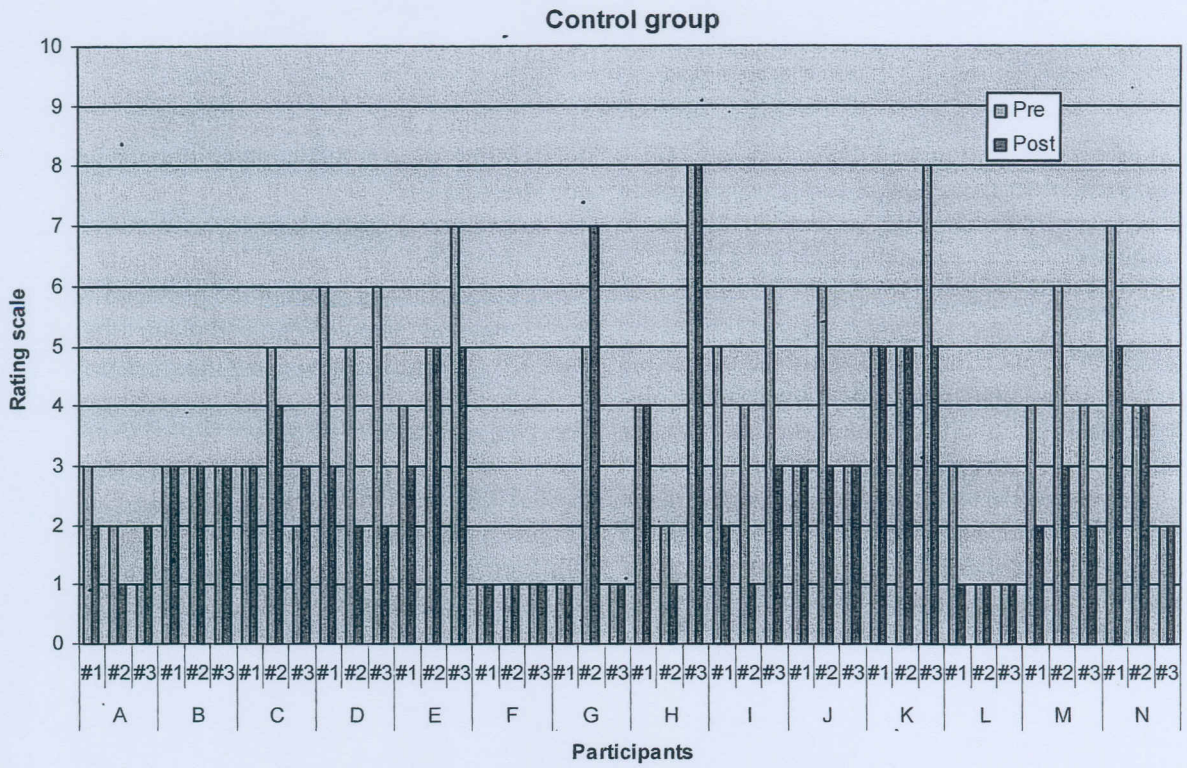

FIGURE 2. Stress level ratings: All shifts for 14 participants, application #1.

application #2 (intervention), respectively. The control group had a range on pre-application and post-application of perceived stress from 1 to 8 and the intervention group had a range from 1 to 10. In the intervention group, participant 1 had an 80% or greater reduction in stress on all 3 shifts, with the

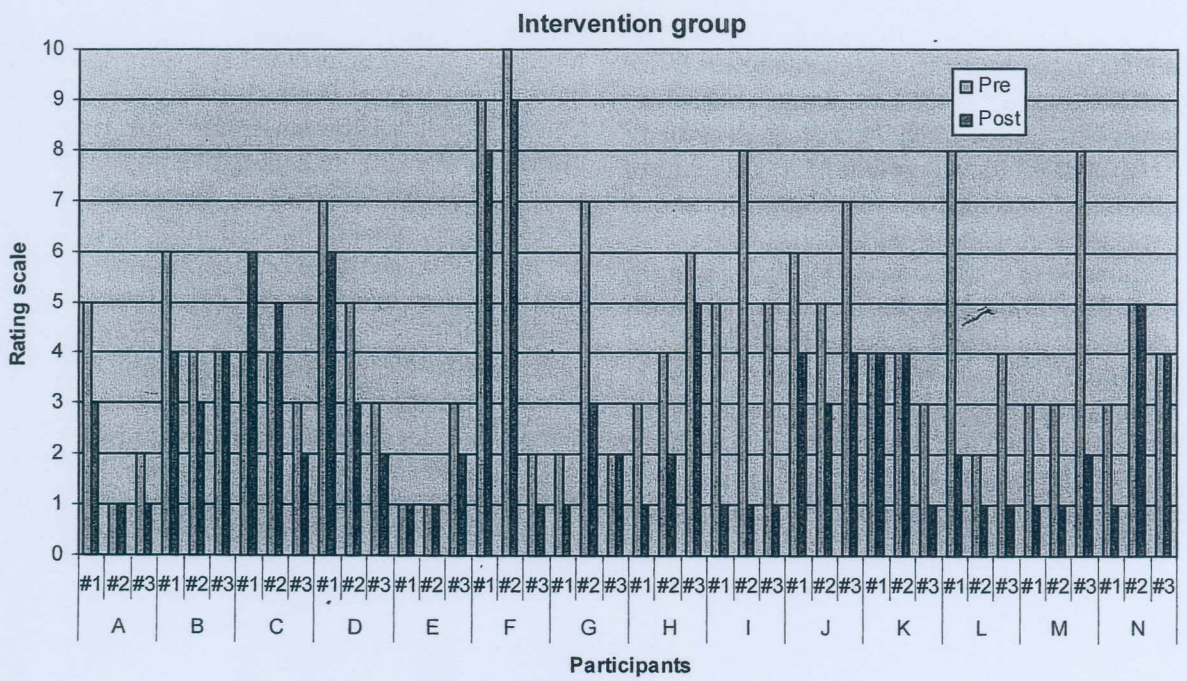

FIGURE 3. Stress level ratings: All shifts for 14 participants, application #2.

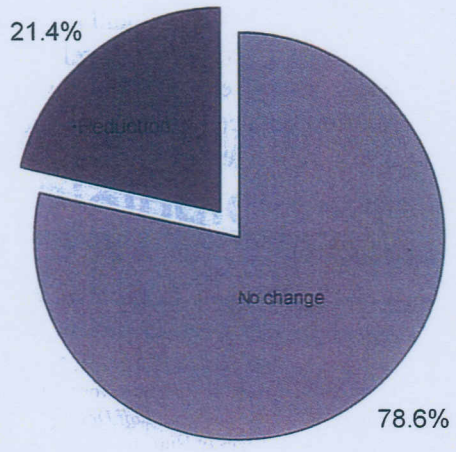

FIGURE 4. Median stress level rating scores over 3 shifts for 14 participants after using application #1.

second shift showing a 7-point drop. Two other participants in the intervention group, L and M, had a 75% reduction or a 6-point drop on one of each of their shifts. In the control group as a whole, the maximum decrease was 4 points.

During the study, selected participants provided the PI with anecdotal comments related to their responses. Participants A, C, and G recorded an increased stress level between pre-application and post-application levels of application #1 on one of each of their shifts. These participants commented that there was a change in their patients' condition, which increased their level of stress. Participant C showed an increased stress level following application #2, reporting she did not care for the smell of those oils.

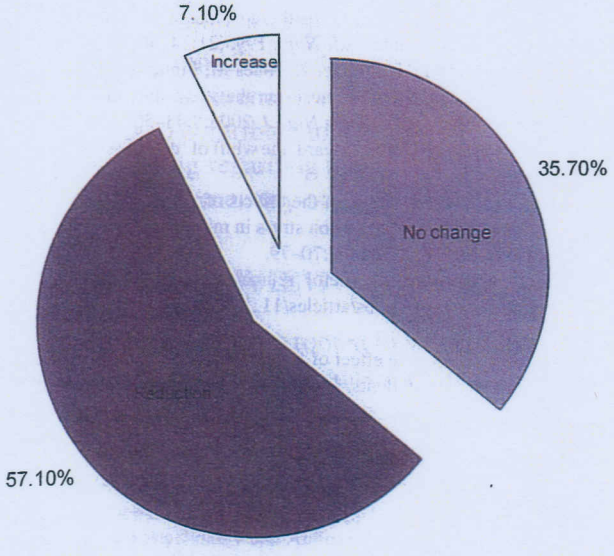

FIGURE 5. Median stress level rating scores over 3 shifts for 14 participants after using application #2.

The median stress level rating was calculated for each participant ($n = 14$) for his or her 3 reported shifts. Figure 4 illustrates that 78.6% of the participants' median scores had no change in perceived stress levels with application #1 (the sweet almond oil), which was expected. It is interesting to note that 21.4% recorded overall reductions in stress with the use of application #1. Figure 5 illustrates that 57.1% of the intervention group recorded an overall decrease in perceived stress in comparison with only 35.7% recording no change in stress levels and 7.1% ($n = 1$) recording an increase in stress following application #2 (with the essential oils).

DISCUSSION

The purpose of this study was to evaluate the effect of topical application of these essential oils on stress levels of nurses in the MSICU. The oils had a positive effect to reduce stress in 31 (74%) of the shifts sampled ($n = 42$). All participants ($n = 14$) recorded a decreased stress level in at least one of the recorded shifts post-application of application #2 (the intervention). This demonstrates potential for a simple, noninvasive process to reduce stress, which could be accomplished in a short-time frame.

It is acknowledged that there are many other factors that could influence results in stress reduction. For example, individuals may handle stress differently, which would affect responses on the rating scale. Also, a nurse may have an unstable patient during his or her pre-application stress rating, which could cause a higher rating of stress. Then, 1 hour after application, the patient may have stabilized and the nurse's stress level decreased. Did the oil have an effect, or did the patient's stability contribute to the reduction of stress? The reverse could also be true: a pre-application stress rating could be low; then, at the post-application rating, the nurse's patient becomes unstable. There is limited ability to control other factors that could increase or decrease stress in this setting.

Some participants noted that application #1 had no smell. The perception may have been that the oil would not decrease stress because it had no odor. When they received application #2 and experienced the smells, they felt like there was something in the application that should work. This may have biased some of the participant's results.

In the intervention group ($n = 14$), there was a wide range of stress levels reported during pre-application: five participants (36%) had pre-application stress level ratings of 8 or above. Two of these demonstrated only a reduction of 1 level post-application. This may suggest that a higher percentage of oil is needed to have a greater effect on stress reduction. For example, an analogy to rating pain on a scale of 1 to 10, a headache rated as a level 10 may prompt an individual to take 2 Tylenol (acetaminophen) tablets instead of 1 to decrease pain. Similarly, greater reduction in stress level may have been demonstrated if a higher (eg, 8%) concentration of essential oils had been used instead of the 5% solution used in this study.

SUGGESTIONS FOR FUTURE RESEARCH

This study was a convenience sample of ICU nurses. A study involving a larger group of participants using many different types of ICU nurses (eg, trauma, cardiovascular, or neurology) would provide a broader spectrum for analysis. Using a different method of application (such as inhalation) may show a difference over the topical application approach used in this study. Also, there are many other essential oils that have calming and anxiety-reducing properties that may have an effect on stress levels in nurses. Comparisons of the effects of those oils would be useful for further knowledge about the use of essential oils and stress reduction among nurses. Experimentation with different solutions (eg, 8% vs 5%) of the essential oils may provide more definitive results.

CONCLUSIONS

In conclusion, the perceived stress level in the intervention group ($n = 14$) decreased in 57.1% of the sample, which indicates that the use of application #2, which was a combination of 5% solution of *L angustifolia* and *S sclaria* in sweet almond oil, had a beneficial effect on work-related stress reduction. This treatment added to other stress reduction methods, such as meditation, chair massage, and pastoral visits, could aid in reduction of overall work-related stress in the MSICU. These strategies are strong potential aids to improve retention, reduce turnover, and generally impact the nursing shortage.

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