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Effectiveness of aromatherapy massage on the stress of the surgical center nursing team: a pilot study

Efetividade da massagem com aromaterapia no estresse da equipe de enfermagem do centro cirúrgico: estudo-piloto

Efectividad del masaje con aromaterapia en el estrés del equipo de enfermería del quirófano: estudio piloto

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ABSTRACT

Objective: To verify the effectiveness of aromatherapy with essential oils of lavender (*Lavandula angustifolia*) and geranium (*Pelargonium graveolens*) associated with massage for stress relief of a nursing staff of the surgical center through evaluation of biophysiological and psychological parameters. **Method:** Pilot study, controlled and randomized clinical trial performed with the nursing team of a surgical center of a teaching hospital in the interior of the state of São Paulo. The intervention comprised six aromatherapy massages with essential oils diluted in neutral cream at concentration 1% each. Heart rate and blood pressure levels were measured before and after each massage session. The Work Stress Scale (WSS) and the List of Stress Symptoms (LSS) were applied before and at the end of the intervention. Statistical analysis was performed with the paired t-test and chi-square test, 95% confidence interval and $p < 0.05$. **Results:** There was a statistically significant reduction in heart rate and blood pressure levels after massage sessions. **Conclusion:** The use of aromatherapy has demonstrated effectiveness for lowering biophysiological parameters of the surgical center nursing staff. Brazilian Registry of Clinical Trials: RBR-6mgqn3.

DESCRIPTORS

Aromatherapy; Burnout, Professional; Nursing, Team; Surgicenters; Operating Room Nursing.

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INTRODUCTION

Work is fundamental to human beings and influences every area of our lives and our health in different ways[1]. In this context, nursing has been recognized as a profession for 50 years and is considered one of the most stressful[2]. The hospital environment has high levels of occupational stress[3] given the constant contact with suffering, pain and death, high work demands and poor recognition of the profession.

Occupational stress originates in the work environment and is a set of phenomena present in workers' body; hence it can affect their health. Organization and administration aspects, work systems, and the quality of human relations are among the main stress generators in the work environment. However, the level of stress developed by workers is also linked to their inherent characteristics: work experience, skill level, personality and self-esteem[4]. Stress can be measured by biophysiological parameters, since there is a significant rise of blood pressure and/or heart rate in people undergoing a stressful situation[5-6], or by means of already validated scales that measure the psychological stress overload[7-8].

In view of this, the creation of stress minimizing strategies, especially occupational stress, is becoming increasingly relevant for improving health workers' quality of life. The National Health Policy of Workers defends the need to develop such strategies. This policy is interlinked with the set of health policies within the Brazilian Unified Health System (Portuguese acronym: SUS – *Sistema Único de Saúde*), and considers its principles. The transversality of health actions of workers and the work are some determinants of the health-disease process[9].

The use of Integrative and Complementary Practices in Health (Portuguese acronym: PICS – *Práticas Integrativas e Complementares em Saúde*) has been receiving worldwide prominence, especially because of stimulation of the World Health Organization itself. In Brazil, the use of some of these therapies has been supported by the SUS through Administrative Rule number 971, which regulates and encourages the adoption of these techniques in care units of states, municipalities and the Federal District[10]. Thus, integrative practices can act as a health promotion tool, because they are inexpensive and represent a strategy for coping with occupational stress by contributing to the improvement of workers' quality of life.

In this sense, aromatherapy can be an alternative complementary practice for treating various health problems. The worldwide growth of scientific research indicates the effectiveness of essential oils through their rational and sustainable use, which demonstrates positive perspectives for health, well-being and quality of life[11].

Aromatherapy is one of the most popular therapeutic resources and has become an expanding area for nursing[12]. Such a practice is the art and science that seeks to promote the health and well-being of body, mind and emotions with the therapeutic use of plants natural aroma through their essential oils, whose molecules can be absorbed by the airways (inhalation) or the skin via topical use[10-11].

Therapeutic results have been attributed to the chemical constituents of essential oils. Regarding lavender, linalool, linalyl acetate, 1.8-cineole and β-ocimene are part of its therapeutic composition. The concentration of each substance may vary depending on the subspecies, methods of cultivation, extraction of the plant and essential oil. For aromatherapy, the two first substances (linalool and linalyl acetate) have a higher degree of importance and can reach, respectively, up to 51% and 35% of concentration[13].

The essential oil of *Pelargonium graveolens* has a characteristic odor that resembles rose. It has been widely used in aromatherapy. The natural components of therapeutic interest are citronellol (up to 45% of its concentration), geraniol (24%), linalool (14%), citronellyl formate and menton[14]. Medical field studies dealing with investigation of therapeutic results inherent to the use of this essential oil for different health conditions are still scarce, as well as those associating these results with chemical constituents of the oil.

In general, the effectiveness of aromatherapy in reducing stress levels has been explained by the relaxation resulting from the exposure to the essential oil aroma. Its volatized chemical molecules influence the decreased activity of the sympathetic nervous system concomitantly with stimulation of the parasympathetic system[15]. This is also associated with a complex molecular mechanism in which essential oils emit a biological signal to recipient cells of the nose, which transmits it to the limbic and hypothalamic system, and triggers the release of neurotransmitters[16].

Considering the characteristic and complexity of surgical center units as triggers of high levels of occupational stress for Nursing teams, the purpose of this study was to develop a care strategy for workers' health based on the use of aromatherapy as an integrative practice. The objective of this study was to verify the effectiveness of aromatherapy with essential oils of lavender (*Lavandula angustifolia*) and geranium (*Pelargonium graveolens*) associated with massage for stress relief of a Nursing staff of the surgical center through the evaluation of biophysiological and psychological parameters.

METHOD

This is a randomized controlled clinical trial pilot study[17]. It was conducted in a surgical center of a teaching hospital in the interior of the state of São Paulo/Brazil. This unit has 13 operating rooms that attend small, medium and large surgeries of various specialties. Eleven rooms are destined for elective procedures, one for urgencies and one for emergencies, where approximately 8,600 surgeries are performed per year.

Thirty-eight Nursing staff workers (nurses and nursing technicians) who met the following inclusion criteria participated in the study: under employment bond and working in the surgical center for at least one year; acceptance to participate in the study, including the stages of the study protocol; score of at least 12 points on the List of Stress Symptoms (LSS); and olfactory acceptance of the *Lavandula angustifolia* and *Pelargonium graveolens* aromas. Exclusion criteria were all workers on vacation or on leave during the data collection period, as well as pregnant women.

A draw was made to randomize participants into two groups: intervention group (IG) and control group (CG). Massage with aromatherapy was performed in the IG. Verification of biophysiological parameters of the CG was not possible during the data collection protocol because of the work process characteristics within the context where the study was performed, and by unavailability of time during the data collection. The intervention was made available to CG after the end of the study protocol according to ethical precepts of research with human beings. Figure 1 shows the distribution of participants in the study protocol.

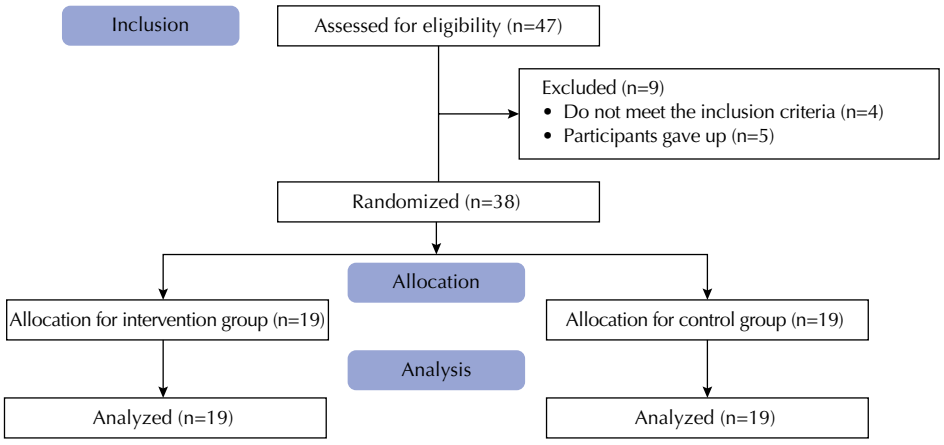


Figure 1 – Flowchart of participants' distribution according to intervention group and control group – Botucatu, SP, Brazil, 2016.

The intervention consisted of six aromatherapy massage sessions with average duration of 10 to 15 minutes each[15], and average interval of 42 hours between sessions. The massage technique applied was *effleurage* (or smoothing), in the posterior thoracic and cervical region. This technique was selected for not exerting pressure on the body area that could stimulate meridian points[18]. Massages were performed by the first author, who was previously trained, and by an aromatherapy specialist nurse during morning and afternoon sessions in the rest area of the sector with participants sitting in an armchair and ensuring their privacy.

The aromatherapeutic formula applied to the massage was a neutral cream containing essential oils of *Lavandula angustifolia* and *Pelargonium graveolens* in the concentration of 1% each, and totaling 2% of essential oil in the formulation prepared by a professional pharmacist. The choice of essential oils was based on previous research conducted by the research supervisor of this study[12] and theoretical references of this complementary therapy[18] by considering the indication for stress.

The heart rate, and systolic and diastolic blood pressure measurements were taken immediately before and after each massage session in order to verify the intervention effectiveness. In addition, before the start of the first massage session and at the end of the sixth, were applied two instruments, namely the Work Stress Scale (WSS) and the List of Stress Symptoms (LSS). The WSS is an instrument with 13 items that deal with the psychosocial nature and psychological reactions to occupational stress. Answers are organized according to a Likert scale ranging from totally disagree to fully agree[7]. The LSS consists of 59 psychophysiological and psychosocial symptoms, marked according to frequency, ranging from never (0) to a few times (1), often (2) or always (3). This instrument score ranges from 0 to 177 points, and is stratified in levels: zero stress (0 to 11 points), low level of stress (12 to 28 points), average level of stress (29 to 60 points), high level of stress (61 to 121 points), and very high level of stress (over 120 points)[8].

Data was entered into a Microsoft Excel® worksheet and processed by the program Statistical Package for Social Sciences® (version 17.0.). Since there was a normal distribution of the population sample, the paired t test was applied for continuous variables in intragroup analysis before and after the intervention. For analysis between groups, it was applied the analysis of variance (ANOVA) in order to verify associations between two variables. For the variables obtained through the WSS, was applied the chi-square test '(χ^2)' because this is a nonparametric method designed for evaluation of evidence of association between two categorical variables. The analyzes considered 95% Confidence Interval (CI) and p-value of 0.05[19].

As proposed by Resolution 466/2012, this study was approved by the Research Ethics Committee of the Faculty of Medicine of Botucatu on June 6, 2016, under number 1576841. Registration number in the Brazilian Registry of Clinical Trials was RBR-6mgqn3.

RESULTS

The study sample included 38 professionals, of which five (13.16%) were nurses and 33 (86.84%) were nursing technicians. The majority was female, married marital status, Catholics, mean age of 39.5 years (standard deviation 9.87; variance 97.41), and reported having at least one leisure activity. Insomnia was reported by 11 (28.95%) subjects, and

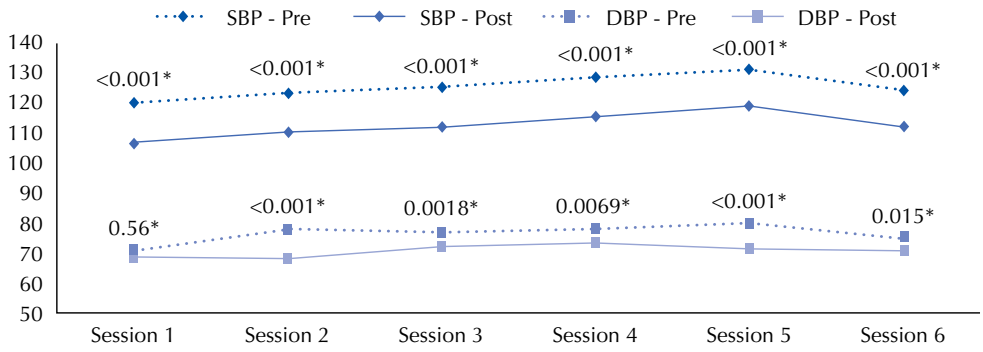
the main cited health problems were migraine, hypothyroidism, cholesterol, disc protrusion, depression, systemic arterial hypertension, diabetes and dyslipidemia. Approximately 50% of the sample reported using medications. Prior use of complementary practices (acupuncture) was cited only by three (7.89%) participants. Table 1 shows the characteristics of the sample, divided into control group and intervention group. Except for the variable of time in the institution, there were no differences with statistical significance, confirming homogeneity among the study groups.

Table 1 – Absolute and relative distribution of sociodemographic characteristics of the study participants separated in control group and intervention group – Botucatu, SP, Brazil, 2016.

Variables	Control group		Intervention group		*p*-value
	N	%	N	%	
Sex					
Female	16	84.21	17	89.47	0.9543
Male	3	15.79	2	10.53	
Age range					
25-39	9	47.37	12	63.15	0.6145
40-55	10	52.63	7	36.84	
Marital status					
With partner	9	47.37	13	68.42	0.0841
No partner	10	52.63	6	31.58	
Religion					
Catholic	12	63.16	13	68.42	0.5798
Evangelical	5	26.32	5	26.32	
Spiritist	2	10.52	0	0	
Not stated	0	0	1	5.26	
Family income*					
Up to 2	1	5.26	3	15.79	0.7238
3 to 4	10	52.63	9	47.37	
5 or more	8	42.11	7	36.84	
Level of training					
Technician	10	52.63	12	63.15	0.8520
Higher education	6	31.58	5	26.32	
Postgraduate education	3	15.79	2	10.52	
Position					
Nursing technician	14	73.68	17	89.47	0.4048
Nurse	5	26.32	2	10.53	
Professional role					
Circulator	10	52.63	11	61.11	0.4343
Assistance	4	21.06	5	26.30	
Referrals	3	15.79	1	5.26	
Recovery	1	5.26	1	5.26	
Director	1	5.26	1	5.26	
Employment bond					
Single	16	84.21	15	78.95	0.6599
Double	3	15.79	4	21.05	
Time in the profession					
Up to 5 years	5	26.32	8	42.08	0.3578
> 5 years	14	73.68	11	57.86	
Time in the institution					
1-4 years	6	31.58	5	26.32	0.0289
5-9 years	6	31.58	9	47.37	
> 10 years	7	36.84	5	26.32	

*Calculation based on minimum wage.

Figure 2 presents the statistical analysis of systolic (SBP) and diastolic blood pressure (DBP) values measured before and after each aromatherapy massage session performed in the intervention group. It is noted that only diastolic pressure values of the first session had no statistical significance.



*p-value according to Student's t-test.

Figure 2 – Statistical analysis of mean values of systolic and diastolic blood pressure (SBP and DBP) of the intervention group before and after six aromatherapy massage sessions – Botucatu, SP, Brazil, 2016.

Statistical analysis of the heart rate demonstrated that its values had a significant decrease throughout the total number of aromatherapy sessions. Together with data in Figure 2, this confirms the intervention effectiveness in reducing health care professionals' stress.

Table 2 – Statistical analysis, mean and standard deviation (SD) of heart rate (HR) of the intervention group before and after six aromatherapy massage sessions – Botucatu, SP, Brazil, 2016.

Massage sessions	Pre-intervention		Post-intervention		*p*-value*
	Mean	SD	Mean	SD	
1	66.53	13.96	57.97	9.52	<0.0001
2	65.32	9.74	59.11	9.75	<0.0001
3	64.11	9.24	59.26	9.80	<0.0001
4	66.75	10.29	62.05	10.31	<0.0001
5	62.53	8.17	57.05	11.76	<0.0091
6	65.26	8.04	57.05	8.11	<0.0001

* p-value according to Student's t-test.

Table 3 shows the statistical analysis of scales applied to verify participants' perception about the stress to which they are exposed in the work environment. Scores improved in both scales, and the greatest difference was found in intergroup comparison. However, no statistical significance was observed in any of the comparisons.

Table 3 – Statistical analysis of scores of the List of Stress Symptoms (LSS) and the Work Stress Scale (WSS) intra and intergroups before and after the aromatherapy massage intervention – Botucatu, SP, Brazil, 2016.

Groups	Pre-intervention		Post-intervention		*p*-value*
	Mean	SD	Mean	SD	
List of Stress Symptoms (LSS)					
Control	45.11	30.62	44.44	27.45	0.9999
Intervention	52.15	30.04	46.31	22.72	0.9202
p*-value	0.8737		0.9971		
Work stress scale (WSS)					
Control	12.11	8.73	13.05	9.64	0.9306
Intervention	5.42	12.36	7.74	11.40	0.9088
p*-value	0.3926		0.4353		

* p-value according to Student's t-test.

DISCUSSION

In this study, there was a statistical reduction in biophysiological parameters, blood pressure values, and heart rate. However, when dealing with psychological aspects, the measurements showed no effect on stress. These results corroborate those found in previous studies that demonstrated the effectiveness of aromatherapy only in physiological parameters[10,12,20-21].

A previous study detected the linalool and linalyl acetate components at human serum levels from topical application through massage with lavender essential oil. Traces of these substances were identified at 5 minutes from the end of exposure, reached peak concentration at 19 minutes, and elimination was observed at 90 minutes by considering the minimum serum concentration[22]. This property can be attributed to positive effects on symptoms related to the central nervous system[13].

Another study analyzed other psychological and neurobiological indicators of the effectiveness of essential oils and their effects on the human system. Essential oils of lavender and geranium were used at concentration 2% each. Psychological evaluations had favorable outcomes, with statistical significance for scales of anxiety (Trait-State Anxiety Inventory), depression (Beck Depression Scale) and subjective well-being (Psychosocial Wellbeing Index)[23]. Even though the same essential oils were used, results do not corroborate those found in the present study. Justification can be that aromatic concentration was higher, as well as the number of massage sessions applied in the intervention, the duration of each massage session, and the body areas included in the procedure.

Neurobiological data from that same study[23] are useful for discussion and for performing other studies involving aromatherapy. Analyzes from electroencephalography and serum cortisol levels suggest that aromatherapy effects are favorable for short periods. This was confirmed by the detection time (19 minutes) of lavender oil chemical components in the bloodstream[22]. This discussion corroborates the results of the present study, which were significant for analyzes done immediately after the end of the massage, i.e. heart rate and blood pressure. They were not statistically significant for the psychological stress assessment questionnaires applied at the end of the intervention, in the sixth massage session.

The reduction in blood pressure levels was observed in other investigations in which the essential oil and method used were different from those of the present study. For example, when using the *Cananga odorata* essential oil at concentration of 2% applied by self-massage in nursing professionals[24]. In addition to blood pressure, heart and respiratory rates had statistically significant reduction in a study using the same essential oils of the present study at concentration 0.5% applied through *effleurage*[12].

A study investigated the effects of topical application of aromatherapy on the stress of nurses in an Intensive Care Unit. Essential oils of lavender at concentration 3% and clary sage (*Salvia sclarea*) at concentration of 2% were used, both diluted in sweet almond (*Prunus amygdalus* var. *dulcis*) carrier oil. By using a numerical scale to measure participants' self-perception of stress, it was identified a reduction of 57% in intervention group versus 21% in control group[25]. It should be noted that participants' frequency of exposure bears similarities to that of the present investigation (six times in two weeks). However, studies are different when it comes to method, the self-application was performed three times during a 12-hour work shift, and also regarding the aromatherapeutic formula, using the *Salvia sclarea* essential oil.

The use of lavender for reducing nurses' stress levels was also investigated in a controlled clinical trial. A statistically significant reduction in stress levels was identified from the third day of inhalation exposure to essential oil at concentration of 3% during the work process[21]. This result is in disagreement with that found in the present study. It is noteworthy that the application method of the essential oil in the aromatherapeutic intervention differed from that used in this study.

The demographic characteristics of the sample show a predominance of the female sex in the present study. This was also demonstrated in several studies with Nursing team subjects, which emphasizes that this is a professional class formed mostly by women[2-3,10,26-27]. The discussion about gender in health work has been expanded given the negative repercussion of the association of professional work day and domestic work that triggers psychic problems because of psychosocial vulnerabilities[26].

Regarding the intervention, participants demonstrated a good acceptance of the aromatic preparation and massage. During aromatherapy sessions, they gave favorable feedbacks about the experience of undergoing a care strategy in the work context by using therapeutic resources of complementary integrative practices. Hence the suggestion for further research investigations associating a procedure that allows the systematization of the experience and workers' conceptions in relation to these therapies.

The limitations of the study are related to the restricted number of participants, and the fact of not including physiological measures in the control group evaluation, which made the comparison of these variables with those of the intervention group impossible. It should be highlighted that the standard deviation was large in both stress evaluation instruments. Thus, from this study, it is suggested the prior establishment of a cohort of participants with a higher level of stress in association with essential oils at a higher concentration in the aromatherapeutic formulation. This study represents the possibility of integrating the methodology of clinical trials with measures of care promotion for workers, besides being a construction of scientific knowledge on the aromatherapy practice.

CONCLUSION

The association of aromatherapy and massage with essential oils of *Lavandula angustifolia* and *Pelargonium graveolens* has demonstrated effectiveness in lowering biophysiological parameters of nursing team professionals of the surgical center. The reduction was evident by the statistically significant decrease of heart rate and blood pressure levels. By considering the psychological evaluation performed through instruments of stress level analysis, no significance was identified, which indicates the need for further studies that qualify the evidence of using aromatherapy for nursing professionals' stress in high complexity settings.

RESUMO

Objetivo: Verificar a efetividade do uso da aromaterapia com óleos essenciais de lavanda (*Lavandula angustifolia*) e gerânio (*Pelargonium graveolens*) associado à massagem para alívio do estresse de uma equipe de Enfermagem do centro cirúrgico por meio da avaliação de parâmetros biofisiológicos e psicológicos. **Método:** Estudo-piloto do tipo ensaio clínico controlado e randomizado, realizado com a equipe de enfermagem de um centro cirúrgico de um hospital escola do interior do estado de São Paulo. A intervenção foi composta de seis massagens com aromaterapia com os óleos essenciais diluídos em creme neutro na concentração de 1% cada. A frequência cardíaca e a pressão arterial foram verificadas antes e após cada massagem e a Escala de Estresse no Trabalho e a Lista de Sintomas de *Stress* foram aplicadas antes e ao final da intervenção. A análise estatística foi realizada com o teste t pareado e qui-quadrado, intervalo de confiança de 95% e p<0,05. **Resultados:** Houve diminuição com significância estatística da frequência cardíaca e pressão arterial após as sessões de massagem. **Conclusão:** O uso da aromaterapia demostrou efetividade na diminuição de parâmetros biofisiológicos da equipe de enfermagem do centro cirúrgico. Registro Brasileiro de Ensaios Clínicos: RBR-6mgqn3.

DESCRITORES

Aromaterapia; Esgotamento Profissional; Equipe de Enfermagem; Centros Cirúrgicos; Enfermagem de Centro Cirúrgico.

RESUMEN

Objetivo: Verificar la efectividad del empleo de la aromaterapia con aceites esenciales de lavanda (*Lavandula angustifolia*) y geranio (*Pelargonium graveolens*) asociado con el masaje para alivio del estrés de un equipo de Enfermería del quirófano mediante la evaluación de parámetros biofisiológicos y psicológicos. **Método:** Estudio piloto del tipo ensayo clínico controlado y randomizado, realizado con el equipo de enfermería de un quirófano de un hospital escuela del interior del Estado de São Paulo. La intervención estuvo compuesta de seis masajes con aromaterapia utilizándose los aceites esenciales diluidos en crema neutra en la concentración del 1% cada. La frecuencia cardiaca y la presión arterial fueron verificadas antes y después de cada masaje y la Escala de Estrés Laboral y la Lista de Síntomas de Estrés fueron aplicadas antes y al final de la intervención. El análisis estadístico se llevó a cabo con la prueba t pareada y chi cuadrada, intervalo de confianza del 95% y p<0,05. **Resultados:** Hubo disminución con significación estadística de la frecuencia cardiaca y presión arterial luego de las sesiones de masaje. **Conclusión:** El uso de la aromaterapia demostró efectividad en la disminución de parámetros biofisiológicos del equipo de enfermería del quirófano. Registro Brasileño de Ensayos Clínicos: RBR-6mgqn3.

DESCRIPTORES

Aromaterapia; Agotamiento Profesional; Grupo de Enfermería; Centros Quirúrgicos; Enfermería de Quirófano.

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