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☑ Implementation science in nursing, health, and education

Effects of aromatherapy on the overload and fatigue of informal elderly caregivers: a pilot study

Efeito da aromaterapia na sobrecarga e na fadiga dos cuidadores informais de idosos: um estudo piloto

Efecto de la aromaterapia en la sobrecarga y la fatiga de los cuidadores informales de ancianos: un estudio piloto

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ABSTRACT

Objective: To verify the effect of aromatherapy (inhaled or via the skin) with lavender, sweet orange and bergamot essential oils on caregivers' overload and fatigue.

Method: Pilot, quasi-experimental, randomized, non-blind and parallel study with two groups. The reduced Zarit Burden Interview and Revised Piper scales were used, comparing the effect of two routes of administration. The recommendations of the Consolidated Standards of Reporting Trials were respected. Final sample with 23 caregivers of elderly people cared for by the Home Care Program of a University Hospital, in the city of São Paulo, between May and September 2021. To analyze the outcome after 21 days, the Wilcoxon test was used to compare the effects. For the linear model, and for the variable perceived duration of fatigue, the Cumulative Link Mixed Model was used. The significance level adopted was 5%.

Results: Temporal perceptions of fatigue were reduced throughout the study for the groups. However, there was no decrease in overload or fatigue, regardless of the moment and groups.

Conclusion: Overload and fatigue were reduced in the group that received the treatment through inhalation, showing no statistical significance.

Keywords: Aromatherapy. Nursing. Caregivers. Fatigue. Aged.

RESUMO

Objetivo: Verificar o efeito da aromaterapia (via inalatória e cutânea) com os óleos essenciais de lavanda, laranja doce e bergamota na sobrecarga e na fadiga dos cuidadores.

Método: Estudo piloto, quase experimental, aleatorizado, não cego e paralelo com dois grupos. Utilizaram-se as escalas de Zarit Burden Interview reduzida e Piper Revisada, comparando o efeito de duas vias de administração. Foram respeitadas as recomendações do Consolidated Standards of Reporting Trials. Amostra final com 23 cuidadores de idosos atendidos pelo Programa de Atenção Domiciliária de um Hospital Universitário, na cidade de São Paulo, entre maio e setembro de 2021. Para a análise do desfecho pós-21 dias utilizou-se o teste de Wilcoxon, para comparação dos efeitos, o modelo linear e para a variável tempo de fadiga percebida, o Cumulative Link Mixed Model. Nível de significância adotado foi 5%.

Resultados: As percepções temporais de fadiga reduziram ao longo do estudo para os grupos, no entanto, não houve diminuição de sobrecarga ou fadiga, independentemente do momento e grupos.

Conclusão: Observaram-se atenuações de sobrecarga e fadiga no grupo inalatório, sem significância estatística.

Palavras-chave: Aromaterapia. Enfermagem. Cuidadores. Fadiga. Idoso.

RESUMEN

Objetivo: Verificar el efecto de la aromaterapia (inhalativa y dérmica) con aceites esenciales de lavanda, naranja dulce y bergamota sobre la fatiga y la sobrecarga de los cuidadores.

Método: Estudio piloto, cuasi experimental, aleatorizado, no ciego y paralelo con dos grupos. Se utilizaron la escala reducida de la *Zarit Burden Interview* y el *Revised Piper*, comparando el efecto de dos vías de administración. Se respetaron las recomendaciones de las Normas Consolidadas de Informes de Ensayos. Muestra final con 23 cuidadores de personas mayores atendidas en el Programa de Atención Domiciliaria de un Hospital Universitario, en la ciudad de São Paulo, entre mayo y septiembre de 2021. Para analizar el resultado, a los 21 días se utilizó la prueba de Wilcoxon. Para comparar los efectos del modelo lineal y para la variable tiempo de fatiga percibida se utilizó al Modelo Mixto de Enlace Acumulativo. El nivel de significancia adoptado fue del 5%.

Resultados: Las percepciones temporales de fatiga se redujeron a lo largo del estudio para los grupos. Sin embargo, no hubo disminución en la sobrecarga o la fatiga, independientemente del momento y de los grupos.

Conclusión: Se observaron atenuaciones de sobrecarga y fatiga en el grupo de inhalación, sin significancia estadística.

Palabras clave: Aromaterapia. Enfermería. Cuidadores. Fatiga. Anciano.

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INTRODUCTION

Changes in the demographic and epidemiological profile of Brazil show that the country's population is increasingly older and affected by chronic non-communicable diseases. This profile has led to a greater demand for home care and the need to adapt health services to attend the economic and integral needs of each individual[1-2].

Still, the continuity of home care always depends on a main caregiver, who is often a family member or someone of the sort, with no health care training [3]. Generally, elders depend on their relatives for daily life activities, overloading these caregivers in their daily routine.

The stress provoked by the routine of care can change the quality of life of the family member, leading to overload, psychiatric symptoms, fatigue, and use of medications due to the absence of family support. This can make them more vulnerable to depression, tiredness, and to an unbalanced life[4]. A study found higher levels of depression and melancholy in family caregivers, with 41.6% presenting intense overload [5].

The role of caregiver includes many responsibilities that are attributed when the relative becomes ill, in addition to changes in home dynamics that have repercussions in their personal and social lives. In most cases, the caregiver suddenly becomes the sole responsible for the care of the elder and may be psychologically and technically unprepared to perform this new role. This lack of social support, associated to overload, may negatively affect the daily routine of the family, leading to family dysfunction. Both the family dysfunction and the overload in elderly caregivers can have a negative effect on the quality of the care provided[1].

As proposed in Kocalba's Comfort theory, the nurse is responsible for considering the elder and their family, respecting particularities and understanding their real psycho-physical-emotional needs as to promote relief, tranquility, or transcendence, leading to a state of wellbeing[6] through appropriate interventions.

Strategies for the relief of overload and fatigue in family caregivers are important because, as they assume the responsibility for care, they abandon their routines to provide comfort and quality of life to their relatives. Furthermore, the caregiver often becomes intensely involved with the elder, thus forgetting their own health needs and their physical, psychic, and social wellbeing. This indicates the relevance of nursing interventions, with strategic actions directed at preventing and/or reducing the overload of informal elder caregivers[1].

Integrative and Complementary Practices of Health (PICS) are among the interventions that can have physical and emotional therapeutic effects, potentially affecting the wellbeing or comfort of users. One of these interventions is aromatherapy, which is supported by the PICS[7] for specialist nurses and one of the procedures included in the national registration of specialized services in the Single Health System (SUS). It is a technique that applies essential oils (EO) to the skin or via inhalation, helping recover one's biopsychosocial balance[8].

In the scope of nursing, Florence Nightingale, during the Crimean War, recommended the application of lavender OE on the foreheads of soldiers to calm them down. More recently, in the XX century, Marguerite Maurye, a nurse, biochemist, and aromatherapist, combined her nursing knowledge to EO to prescribed them in association with massages, to promote one's integral wellbeing[9].

A study with patients in dialysis found that aromatherapy, with or without massages, using lavender and sweet oranges EO three times a week for eight weeks, helped reduce patient's fatigue[10]. In the group who inhaled the EO, a gauze with one drop of lavender and one of sweet orange was attached to the collar of the shirt of the patient for 20 minutes. The skin group received a 10-minute massage with sweet almond oil, enriched by the same EOs at a proportion of 3%. Both interventions reduced fatigue. However, the group that received the EO through the skin showed more powerful effects[10].

A revision study and meta-analysis about the effects of aromatherapy for relieving fatigue in adults showed that, although the frequency and time of treatment were different, there were positive effects both in inhalation and massage using lavender EO, either in isolation or together with other EOs[11].

Concerning depressive symptoms, a meta-analysis of randomized clinical trials with 27 studies showed significant effects of aromatherapy in softening signs of depression, presenting moderate effects in people with different clinical conditions. The effects were better for combined EOs, inhaled, and in older people[12].

A randomized clinical trial compared a control group with no interventions to a group of elders with dementia who received massages with lemongrass EO and eucalyptus in jojoba oil, in a proportion of 2:1, for 10 minutes three times a week, in the afternoon, and inhaled these EO daily, before sleep. The intervention was found to significantly reduce the agitation and neuropsychiatric symptoms of the elderly, as well as the overload and anguish of the caregiver, as evaluated by the Zarit Burden Interview scale (ZBI)[13].

Our hypothesis is that an EO of lavender, sweet orange, and bergamot, in a total concentration of 2%, reduces the overload and fatigue perceived by the caregivers, and that aromatherapy through the skin has a better performance

than via inhalation. As a result, the goal of this study was to evaluate the effects of aromatherapy (inhalation or skin) with essential oils of lavender, sweet orange, and bergamot, on the overload and fatigue of caregivers.

METHOD

This is a quasi-experimental, randomized, simple, unblinded, parallel study, with two intervention segments. All recommendations of the Consolidated Standards of Reporting Trials (CONSORT) were respected [14].

This study was carried out with family caregivers of elders attended in a Home Assistance Program (HAP) provided by a teaching hospital in the city of São Paulo, Brazil. The HAP is a home care service in effect since 2000, whose goal is help patients, especially elders in palliative care, wit neurological sequelae, bedridden, with high social demands, in addition to providing guidance to their caregivers. The program includes multiprofessional actions of physicians, nurses, social workers, physical therapists, and others in the healthcare to caregivers and patients. During this study, 54 elders were being monitored and their family caregivers, who lived in the region attended by the service. The main conditions of these elders were: dementia, amyotrophic lateral sclerosis, cancer, and ulcers.

The population included family caregivers of the elderly assisted by the HAP. A convenience sample was formed by 30 caregivers, who were all relatives of patients attended by the HAP from May to September 2021 who were interested in participating in the study and in accordance with inclusion criteria. Since this is a pilot study, no sample calculation was needed.

The following inclusion criteria were established: being the main caregiver of an elder registered in the HAP for at least six months, minimum age of 18 years, a minimum score of 13 in the Mini-Mental State Examination[15] for illiterate patients, of 18 for those with low/medium educational level, and of 26 for those with a high educational level[15]. Exclusion criteria included: being graduated in a health profession or trained for care, being pregnant, or having self-reported allergies to the EOs used in the intervention.

Participants were recruited through an active search for caregivers of relatives assisted by the HAP. The caregivers in accordance with the selection criteria were invited to participate in the research through a phone call, in which the best time for the home visits was scheduled. After being explained the goals of the research, those who accepted the invitation signed the Informed Consent Form and had their cognitive function evaluated by the MMSE.

The caregivers who reached the minimum MMSE score were selected and randomized into two groups: one group received the aromatherapy via the skin (G1) and another via inhalation (G2). This was done using the software Research Randomizer Quick Tutorial (https://www.random.org/integers/) for a simple randomization, carried out by a researcher who did not take part in applying the intervention. All caregivers approached met the inclusion criteria.

A written questionnaire was applied for a demographic characterization of the caregivers, including their kinship degree, age, sex, marital status, occupation, educational level, and psychotropic drug use. This questionnaire was applied during the home visits of the HAP team and the main researcher. The confidentiality of patient data was ensured.

The overload of caregivers was evaluated by the ZBI scale [16], which is comprised by 22 items, the Brazilian version of the Burden Interview, which is a standardized and validated instrument that can be used in the study of the impact of mental and physical disease in informal caregivers[17]. Later, we evaluated the psychometric measures of elder caregivers with different conditions, and three factors with internal consistency higher than 0.7 were found: Tensions regarding the role of caregiver, Intrapsychic Tensions, and Competences and Expectations[18]. We chose to use the reduced version of the ZBI scale, which is recommended by the open university of the Single Health System (SUS) and the Basic Health Secretariat [19], which includes seven items to be filled in by the caregiver in the absence of the elder. The items were presented in a Likert scale with five possible responses (Never, Almost never, Sometimes, Frequently, Almost always). The results were interpreted as mild for scores of 14 or lower; moderate from 15 to 21; and severe for 22 and above[19]. The items in the scale have two domains: Tensions regarding the role of caregiver (questions 1, 2, 5, 7) and Intrapsychic tensions (questions 3, 4, 6).

To evaluate the fatigue of the caregiver, the EFP-R scale, validated in Portuguese, was used[20]. This scale has 22 items, scored from 1 to 10, and five open questions, which are not used in the calculation of the final score. The questions of this scale are divided in three domains: behavioral (2 to 7), affective (8 to 12), and sensory/psychological (13 to 23), allowing to understand the fatigue in each individual better. The higher the score, the higher the fatigue.

SBI-R and EFP-R scales were applied in three different moments: before the intervention started (t_1), three weeks later, when the intervention ended (t_2 – 21 days), and three weeks after the intervention had ended (follow-up). All questions were answered on paper by the participants during the home visits, ensuring the confidentiality of all participant data.

Information on the patient was restricted to their main ND, defined according with the North American Nursing Diagnosis Association, 7– NANDA-I[21] and recorded in the patient's medical records during the HAP follow-up.

G1 received an amber roll-on flask with the EO containing the synergy of lavender, sweet orange, and bergamot, diluted in vegetable grape seed oil in a concentration of 2%. The participants received recommendations of sliding the roll-on flask on the medial third part of their forearms, rubbing for five seconds, three times a day: when waking up, after lunch, and before sleeping, for 21 consecutive days.

G2 received an oil diffuser in the form of a personal necklace with an open pendant where one could introduce a piece of cotton upon which drops of the EO synergy should be instilled, so they would be inhaled via volatilization. The participants were given an amber flask with the synergy, with a dropper, and asked to place two drops of it on the cotton, twice a day: as they woke up and as they slept.

The participants themselves carried out the applications, after a previous in-person guidance provided by the research at the time the synergy was delivered to them. They were monitored via phone until the intervention was over. After the 21 days (t_2), the aromatherapy was considered to be finished.

Data was inserted in a Microsoft Excel® spreadsheet, in such a way as to ensure the anonymity of participants, who were identified by acronyms. The analysis was conducted by a statistician, using the R software version 4.1.2 (R Core Team, 2021). The total EFP-R score considered the mean score of all items in the instrument, and the score for each domain was calculated by the mean of the score of the items in that domain. The score used by the EFP-R scale in oncology classifies fatigue in the following categories: no fatigue (0), mild (1 to 3), moderate (4 to 6), and intense (7 to 10). To analyze the five open questions of the EFP-R, the answers were grouped into categories. The score of the ZBI-R (from 5 to 35 points) is found by adding up the score of each item. The results were interpreted as mild for scores of 14 or lower; moderate from 15 to 21; and severe for 22 and above.

The variables were described using positional (mean, median, minimum, and maximum) and variability statistics (standard deviation). Pearson's 2 or Fisher's exact tests were used to compare the homogeneity of the groups in case of categorical variables; Mann-Whitney's was used for continuous variables, as the sample was too small.χ To analyze the effects of the aromatherapy on the fatigue and the overload after 21 days, regardless of the form of administration of EO, we used Wilcoxon's test. We used the linear mixed effects model to compare the effects of the EOs through time in each type of administration, as well as their potential interactions with age, type of family relation, employment, use of psychotropic drugs, and the ND "Impaired verbal communication". The Cumulative Link Mixed Model (CLMM) was used to analyze the variable duration of the fatigue as perceived throughout time in the groups. The significance level adopted was 5%.

This study was in accordance with Resolution 466/12 of the National Health Council[22] and approved by the Ethics Committees of the Nursing School of the Universidade de São Paulo (opinion 4.578.945). It was also approved by the teaching hospital of the Universidade de São Paulo (HU-USP) (opinion n. 4.614.027).

RESULTS

The original sample was formed by 30 caregivers. However, there were losses due to death of the elder (n=4), low adherence to the EO treatment (n=2), and nausea caused by the olfactory stimulus (n=1). Figure 1 shows the flowchart of the intervention.

The final sample was formed by 23 caregivers with a mean age of 57±10.4 years. The MMSE mean was 26.7±3.1, a suitable number for the intervention, considering the criteria established. There was no statistical difference between the groups regarding age (p=0.800) and MMSE (0.701).

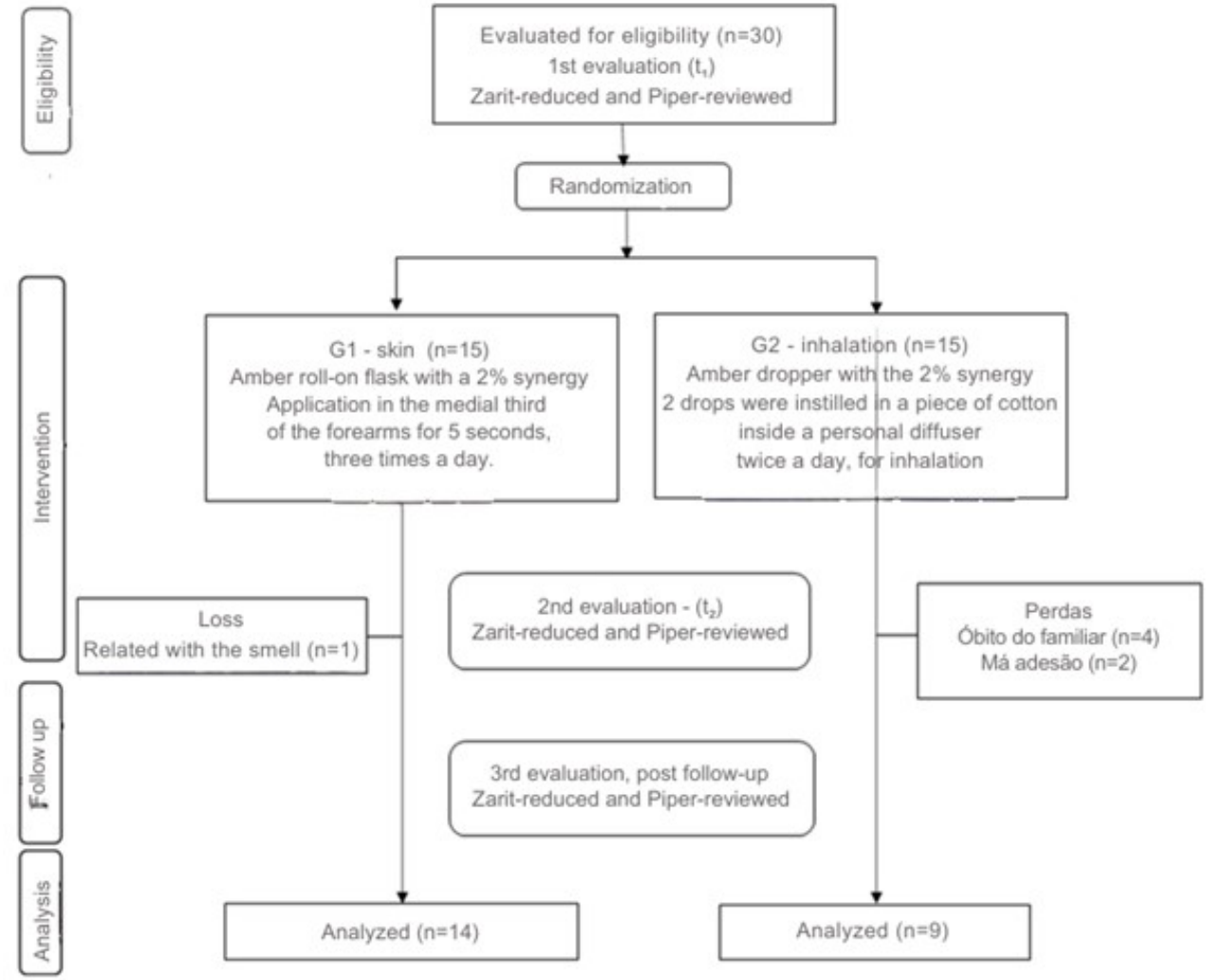
According with the sociodemographic profile of the caregivers, most were female (82.6%), 56.5% were children of the elder, 26.1% were spouses of the person cared for, 56.5% were married, and 69.6% were not in the job market. Most had finished high school (34.8%) or a higher education level (21.7%). These characteristics were homogeneous among intervention groups (p>0.05), showing that the difference between the groups was not statistically significant.

The use of psychotropic drugs was also homogeneous comparing both groups (p=0.643). 21.4% of G1 and 33.3% of G2 used antidepressants such as Sertraline, Fluoxetine, Venlafaxine, Nortriptyline; one of the caregivers also used Levomepromazine, an antipsychotic that can be recommended for anxiety and pain. Another used valproate sodium for epileptic states. It is worth noting that two G1 caregivers stated they use Sertraline and Fluoxetine for fibromyalgia.

Regarding the ND of the elders being cared for, three NDs were common to all of them: impaired physical mobility, risk of falls, and self-care deficits. Other common diagnoses were frailty syndrome, risk of pressure wounds, and diarrhea. The only ND that was more frequent in one group than in another was "impaired verbal communication" (p=0.040), which was about twice as prevalent in G1.

All family caregivers in the study presented the ND "tension in the role of caregiver".

Figure 1 – Flowchart of the study intervention. São Paulo, SP, Brazil, 2023.



Source: Authors.

In the beginning of the study (t_1), the score in the EFR-R was approximately 5.8 points, with 5.3, in the behavioral, 1.2 in the affective dimension, and 5.6 in the sensory/psychological dimension. These values correspond to a moderate state of fatigue, with the exception of the affective dimension, which presented a mild level of fatigue, since, according to this scale, the higher the score, the greater the fatigue.

Factors that contribute to the fatigue, as reported by the caregivers, were the excessive responsibility, the routine, and the health condition of their relative. The caregivers reported that, in addition to the fatigue, they felt pain and tiredness, and one person in the G2 mentioned the COVID-19 pandemic as a contributing factor to their fatigue. To relieve the fatigue, caregivers considered factors such as sleeping, participate in social situations/talking, and resting.

The mean ZBI-R score at first (t_1) was 23.9±5.9. The overload levels were: 17.3% (n=4) mild; 30.4% (n=7) moderate and 52.1% (n=12) severe. The initial ZBI-R scores added up to 99.8%, which required rounding up to 100%.

When we compared the first stage the groups, despite the predominance of severe overload in both, only G1 showed moderate overload, while only G2 showed mild overload (p=0.039).

After 21 days of intervention (t_2) using the EO synergy, scores did not show a significant reduction of the overload as evaluated by the ZBI-R (p=0.235) as a whole, nor did its Behavioral (p=0.201) and Sensory/Psychological (p=0.322) domains. In the Affective Fatigue domain, however, there was a significant reduction (p<0.005). Fatigue showed no significant reduction in the EFP-R (p=0.254) nor in the domain of Intrapsychic tensions (0.259); however, there was a

positive effect on the domain Tensions related to the role of caregiver (p<0.005), a result that was maintained in the follow up stage(t_3) (p<0.005).

Participant reports regarding their perception of fatigue in time showed a different proportion in the different moments evaluated, with a notable reduction in "years of fatigue", especially from t_1 to t_2 (p=0.102). In the paired analysis, it was found that, for 37.5% (n=9) of caregivers, there was at least reduction, be it from t_1 into t_2 or from t_2 to t_3. This happened, for the most part, in G1.

The mean ZBI-R score in t_1 was 23.6±4.6 in G1 and 24.3±7.9 in G2; for the Tensions regarding the role of caregiver, it was 17.9±3.6 in G1 and 18.1±5.9 in G2; and for Intrapsychic tensions, it was 5.8±1.7 in G1 and 6.2±2.3 in G2 (Figure 2). Although there is a tendency for a decline in ZBI-R scores and its domains throughout the G2 score, this effect was not significant (0.144). In the Intrapsychic tensions domain, since the lines are turning towards different directions, the trend is more evident, and there was almost a significance in the interaction between groups and evaluation moments (p=0.080).

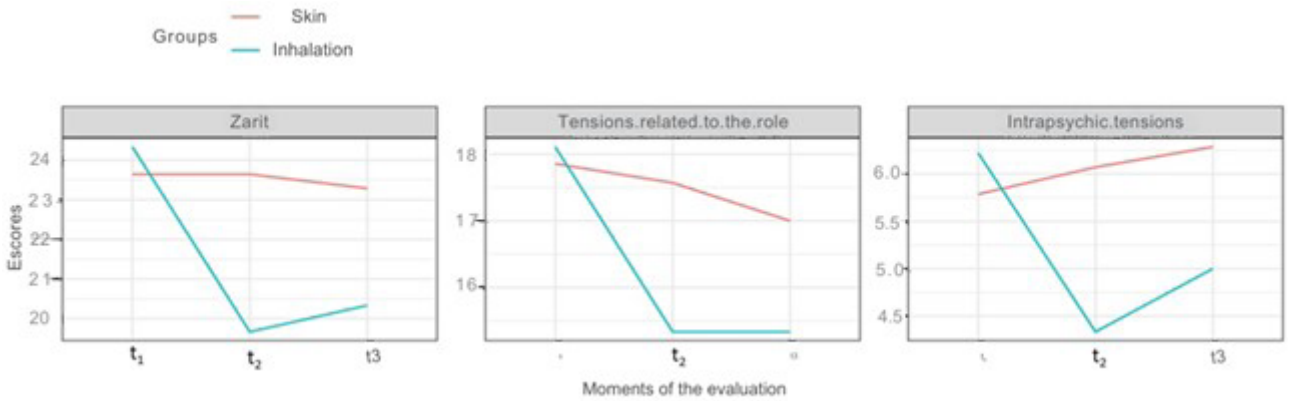
The multiple linear regression analysis showed that no variable interfered in the ZBI-R, including age of the caregivers (p=0.861), the type of family relationship between the caregiver and the elder (p=0.203), employment (p=0.570), psychotropic drug use (p=0.570), or "Impaired verbal communication" (p=0.052). Regarding the dependent variable Tensions regarding the role of caregiver, there were no confounding variables, including age (p=0.678), employment (p=0.104), type of family relation between the caregiver and the elder (p=0.215), use of psychotropic drugs (p=0.615), and having the ND "Impaired verbal communication" (p=0.105). On the other hand, the Intrapsychic tension domain, considered as a dependent variable, was influenced by the ND "Impaired verbal communication" ND (p=0.014). The other variables – age p=0.6844), employment (p=0.151), caregiver relationship with the elder (p=0.223), and psychotropic drug use (0.515) – did not interfere.

Regarding caregiver fatigue, the mean score of the EFP-R was 5.9±1.6 in G1 and 5.6±1.9 in G2; in the affective domain it was 6.0±2.4 in G1 and 5.2±2.5 in G2; and in the sensory/psychological one, the mean score at t_1 was 5.7±1.5 in G1 and 5.5±2.1 in G2 (Figure 3). There was also a trend towards a decline in the EFP-R scores and their domains after 21 days in both groups, except in the Behavioral domain, which showed a minimal reduction in G1. The only significant statistical difference was in the affective domain (p<0.005), in the evaluation of the difference between t_1 and t_2. However, when confusion variables were included in the model in a multiple linear regression analysis of the study, this result lost its significance (p=0.05).

The multiple linear regression analysis showed that confounding variables in the elder — age, type of relationship, employment, use of psychotropic drugs, and the ND "Impaired verbal communication" — did not interfere with the results of the intervention on the EFP-R and its domains (p>0.05).

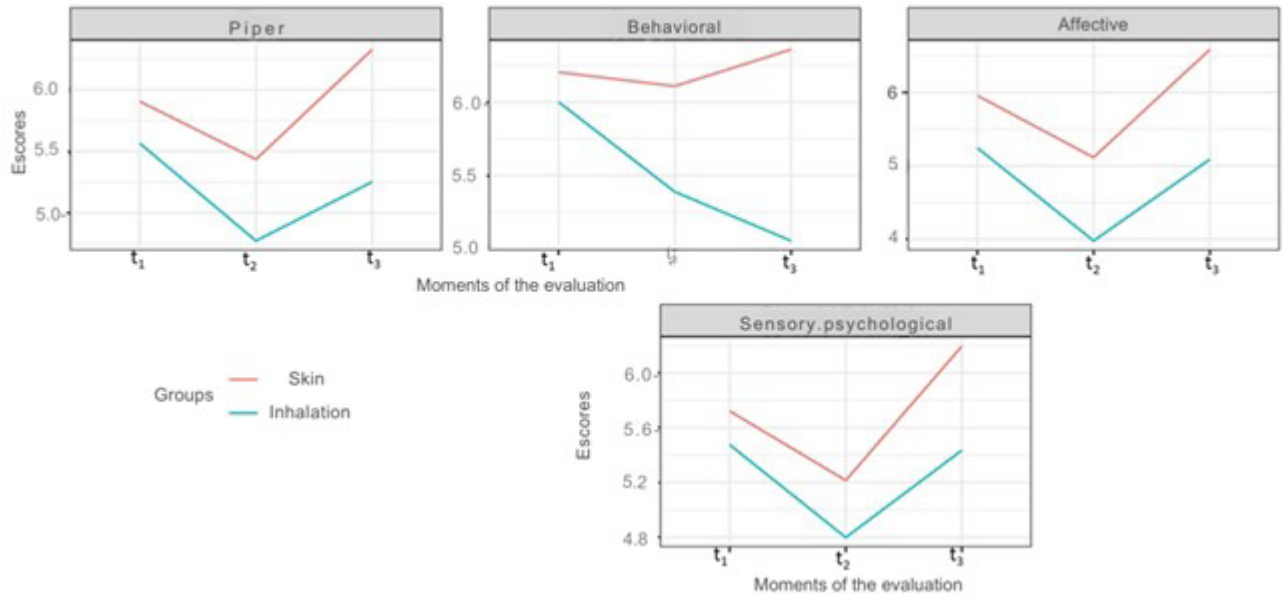
Considering the reported time perception of fatigue in the EFP-R, there was no statistically significant difference between the groups (p>0.660), but there was a difference in the frequency of responses over time (p=0.006). Both groups, G1 and G2, reported perceiving more fatigue for years, with a reduction over time. There were few reports of lack of fatigue in t_2 or t_3 (Figure 4).

Figure 2 – Behavior of the scores of the overload scale (ZBI-R) and its domains, according to the route of administration of the aromatherapy and the moments of evaluation. São Paulo, SP, Brazil, 2023.



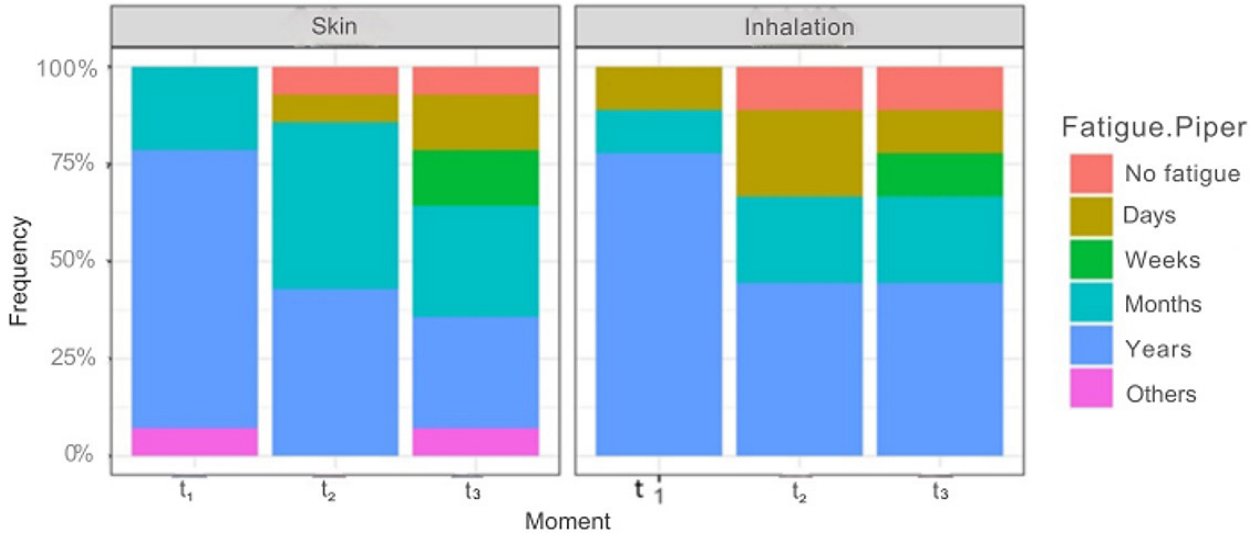
Source: Authors.

Figure 3 – Behavior of the scores in the fatigue scale (EFP-R) and its domains, according with the route used to apply aromatherapy and the moments of the evaluation. São Paulo, SP, Brazil, 2023.



Source: Authors.

Figure 4 – Frequency of the time of perception of fatigue at the moments evaluated. São Paulo, SP, Brazil, 2023.



Source: Authors.

Over time, the answers of caregivers to the open questions in EFP-R were constant to a certain degree; the answers "I do not know" and "I got better after finding help" were grouped under "Others". When reporting what they do to relieve fatigue, some answers were related to "self-care", such as dancing and exercise.

The synthesis of the results found shows that the inhalation method of applying aromatherapy was more successful, when considering interventions related to overload and fatigue in family caregivers (Table 1).

Table 1 – Table summarizing the behavior of the scores of the fatigue (EFP-R) and overload (ZBI-R) scales, according with the evaluation movements and the intervention groups. São Paulo, SP, Brazil, 2023.

G1 (for 21 consecutive days)				G2 (for 21 consecutive days)		
Moments of the evaluation	**Intervention**	**ZBI-R scale**	**EFP-R Scale**	**Intervention**	**ZBI-R scale**	**EFP-R Scale**
before the start of the intervention (t_1)		~23.6	~5.9		~24.3	~5.6
at the end of the intervention, three weeks after it began (t_2 – 21 days)	slide the roll-on flask with the EO synergy in the third medial part of the forearms and rub it for 5 seconds.	~23.5	~5.4	place to drops of the EO mix for inhalation via volatilization	~19.5	~4.4
3 weeks after the end of the intervention (follow-up)		~23.2	~6.4		~20.7	~5.2

Source: Authors.

DISCUSSION

This study showed that the main family caregivers are mostly women, usually from the family core, such as children and spouses, married, and with a mean age that is similar to the age of the elder they are caring for. This corroborates the findings of a meta-analysis[13], although a national study[1] found caregivers to be 10 years younger than those in this study, on average.

All caregivers that took part in this study presented the ND "Tension in the role of caregiver", which shows homogeneity in the sample regarding potentially stressful situations experienced by caregivers, which could result in overload and biopsychic fatigue. Furthermore, the ND of the elders showed a profile of needs of care that justify the tension and the overload of the caregiver, so much so that the ND "Impaired verbal communication", found in some elders, interfered in the outcomes evaluated by the domain "Intrapsychic tensions" of the ZBI-R.

The application of the EO is a holistic action aimed at reducing overload and fatigue, since overloaded elder caregivers have a low quality of life[23]. The lavender EO, which is considered to be anxiolytic and antidepressant, reduces muscle fatigue and insomnia. It was used to improve the action of the other EOs and minimize the potential effects of emotional discomfort, making its application safer. The sweet orange EO is invigorating, as it reduces physical and mental exhaustion, minimizing anxiety and tiredness. The bergamot EO is antidepressant, and minimizes agitation, irritability, stress, and nervous tensions [24]. In general, citrus EO give an aspect of lightness and happiness to the environment, favoring social interaction[25]. After the intervention, there was a decrease in the mean overload in G2, which went from severe to moderate; however, there was no statistical significance. The visual representation of the outcomes according to the form of application, however, showed that fatigue tends to decrease in the Behavioral and Affective domains, and overload tends to decrease in the domain "Tensions regarding the role of caregiver", in G2. Still, in the Behavioral domain, the reduction remained consistent until the follow-up, while the domain "Tensions regarding the role of caregiver" showed stable scores.

The results found suggest that the inhalation may be more promising for interventions related to overload and fatigue in family caregivers. This finding is not in accordance with the hypothesis proposed by this study.

Although it was carried out with hemodialysis patients, a study compared the effects of aromatherapy on fatigue using lavender and sweet orange EOs, in two types of intervention: one on the skin, using massages, and the other via inhalation. It found that both modalities reduced fatigue, but the massage with the EO had a better effect than inhalation[10]. The better

results of the skin aromatherapy may be related to a potential synergy between the EO and the massage, which may mask the real individual effects of aromatherapy and massage.

A study with caregivers of patients with stroke sequelae, showed that individuals affected have a moderate degree of functional incapacity, and the caregivers were overloaded with the role of caring and with a compromised quality of life; the personal and psychological relationship domains were the less affected, while the physical and environment domains were the most affected[26]. This study found that inhaled aromatherapy tended to work better, and this type of therapy is mainly environmental. In this regard, this investigation contributed to outline potential routes of administration that could lead to beneficial effects to reduce the overload and fatigue of these caregivers.

There was no statistical diminution of fatigue in this study. However, the qualitative perception of the caregivers varied regarding the timing of the fatigue. Most participants stated, before the intervention, that they had been fatigued "for years". After the aromatherapy interventions, the perception of "days" and "months" was more pronounced than earlier, and there were even responses indicating "no fatigue".

Participants attributed biopsychic changes to the routine they experienced when caring for their caregivers. These findings were also identified in a study conducted with family caregivers in which they reported body pain, exhaustion, and fatigue related to their routine of care, in addition to remarking that their leisure and social activities were impacted and it was impossible to find formal jobs as they need to provide care[1, 27]. Additionally, it is noteworthy that the COVID-19 pandemic had a strong impact on their biopsychic state, since it was mentioned as something that contributed to the fatigue.

The main challenges faced by caregivers, according to a recent study, are associated to an increased demand of tasks and responsibilities required by care, which leads to overload. Another factor presented in this research shows how hard it is for the family to articulate and attend to the needs of their elders, regarding either the behavior of the elders or the availability of a truly effective network support[28]. Discussions such as these are essential to understand care, that is, to reveal the challenges faced by informal caregivers, finding more elaborate and effective answers according with their real needs.

A systematic review found that aromatherapy was the most investigated PIC modality to control the symptoms of elder patients with dementia. Some studies pointed at the beneficial effects this therapy had on the agitation of the patients, but nearly half of them showed no evidence of improvement in the behavioral and psychological symptoms of dementia. These symptoms are important factors that contribute to overload care. They are associated to a high load of medical and socioeconomic care[29]. These results show how necessary it is to improve the quality of future investigations in this domain.

This is a pilot study, with a small sample size, which presented follow-up losses, and although the profile of caregivers is homogeneous, there were more people in the G1. Additionally, we used a convenience sample, non-probabilistic. The use of psychotropic drugs by the caregivers may have affected their perception regarding the overload and fatigue they experimented, but the use of these drugs did not behave as a confusion variable in our analysis. This study did not consider for how long the participant had been a caregiver, and this variable could be a form of bias.

CONCLUSION

This study found a reduction in overload from severe to moderate in G2. It remained moderate after the intervention. The hypothesis of the study was proven wrong, as both forms of administration found similar results, although the inhalation showed a tendency of having a better performance than the application on the skin. As for fatigue, it was reduced in both groups, tending towards a better performance in inhalation, especially in the analysis of behavioral and psychoaffective elements. The temporal perception of fatigue by participants decreased throughout the study. These changes in overload and fatigue in the inhalation group had no statistical significance.

Nurses must keep in mind the overload and fatigue of informal elder caregivers, since the health profile of health and population, in addition to its sociopolitical aspects, tend to increase home care services, and the biopsychosocial health conditions of the family caregiver are reflected in the quality of care they are able to provide.

Therefore, this study has shown that family-focused care should be appreciated, especially when there is a caregiver involved. It also works as a warning for the need of specific public policies that can be articulated and integrated, including the informal caregiver, who is the main actor in the home care assistance model.

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