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Comparison of the effects of inhalation aromatherapy using Damask Rose aroma and the Benson relaxation technique in burn patients: A randomized clinical trial

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ABSTRACT

Background: Burn injuries are often accompanied by painful and distressing consequences, which can lead to long-term psychological issues. The most common form of anxiety in burn patients is pain anxiety. It is described as the feeling of fear and pain prediction caused by painful procedures.

Aim: To compare the effects of inhalation aromatherapy using damask rose aroma and the Benson relaxation technique on pain anxiety in burn patients.

Methods: This randomized clinical trial was conducted on 132 patients hospitalized in Motahari Burn Hospital from October 2017 to March 2018. The subjects were selected using a sequential sampling method. Next, they were randomly allocated by the Permuted block randomization method into four groups of rose aroma (5 drops of 40% rose aroma), the Benson relaxation technique, combined rose aroma-Benson relaxation and control. The interventions were performed for three consecutive days and once a day for 20 min, and each session lasted from 45 to 30 min before the daily dressing change. Data was collected using the Persian version of burn specific pain anxiety scale (BSPAS). Data was analyzed using descriptive and inferential statistics via the SPSS software version 16.

Results: Immediately after the intervention, on the first, second and third days, significant differences in pain anxiety among four groups were reported. On the first day, the Scheffé ad hoc test indicated statistically significant differences in pain anxiety between all groups ($p < 0.001$), except rose aroma-plus-Benson relaxation and rose aroma groups ($p = 0.15$). On the second and third days, there were significant differences between the groups in pain anxiety ($p < 0.001$). Furthermore, after wound dressing, on the first, second and third days, statistically significant differences in pain anxiety among four groups were reported. On the first day, the Scheffé ad hoc test revealed statistically significant differences in pain anxiety

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between all groups ($p < 0.001$). On the second and third days, there were statistically significant differences in pain anxiety between the groups ($p < 0.001$), except the rose aroma and Benson relaxation groups. Immediately after the intervention, the maximum effect size was on the first day in the group of rose aroma-plus-Benson relaxation and the lowest effect size was on the first day in the Benson relaxation group. However, after wound dressing, the maximum effect size was on the third day in the rose aroma-pus-Benson relaxation group and the lowest effect size was on the first day in the Benson relaxation group.

Conclusion: The combination of the rose aroma and Benson relaxation has a synergistic effect and has more effects in the reduction of pain anxiety in burn patients than a single intervention. Health care providers can provide these interventions simultaneously and help reduce pain anxiety in burn patients before conducting painful interventions.

1. Introduction

Burn injuries are associated with painful and distressing experiences due to trauma, hospitalization, and therapeutic procedures [1]. Severe burn pain is the worst [2] due to inflammatory responses to wound care such as cleansing, debridement and dressing [1,3]. If analgesics are administered before or during painful procedure, patients still suffer from high levels of pain [4].

Pain in burn patients is not only the result of burn injuries, but also is influenced by the psychological effects of burns that increase pain severity [5]. Burn patients should tolerate painful therapies and often experience a high anxiety level [6]. Therefore, there is a bilateral relationship between pain felt by burn patients and their psychological problems such as anxiety and fear during treatment. Anxiety not only increases pain severity through physical dysfunction in burn patients, but also can hinder wound healing [7]. The most common form of anxiety in burn patients is pain induced anxiety, which is the feeling of fear and pain prediction due to painful therapeutic procedures [8]. Anxiety often occurs before, during and after painful procedures such as dressing changes. If anxiety is not relieved, it is changed to fear, sleep deprivation, depression and disability, ineffective mental coping and patient's lack of cooperation with the treatment process. Accordingly, management of pain anxiety before, during and after therapeutic interventions such as dressing has been emphasized [9,8].

Nurses play an important role in managing pain and anxiety in patients [10]. Nurses spend more time with patients, can assess their pain and anxiety and use non-pharmacological techniques, if needed [8,10]. Due to lack of effective symptom management by current methods, attention has been paid to the use of complementary and alternative therapies as non-pharmacological methods for reducing patients' anxiety [11]. Pain management using non-pharmacological methods consists of a wide range of simple, non-invasive, low-cost techniques without side effects [12]. In recent years, the effect of complementary therapies including music, massage, and relaxation have been studied, but due to controversy results, more clinical trials on their effects are needed [13].

Aromatherapy refers to the use of volatile oils or aromas extracted from aromatic plants for therapeutic purposes [14]. It is used to relieve pain, anxiety, depression, insomnia, fatigue, asthma, and improve self-confidence and creativity [15]. Aroma can be applied in various forms such as skin massage and inhalation directly and indirectly [16]. In a study on burn patients, inhaled aroma treatments have shown beneficial effects on the reduction of stress and anxiety in burn patients [17]. Rose aroma contains steric, ketone, aldehyde and terpenic compounds, which reduces anxiety through stimulating the olfactory center in the brain [18].

Relaxation as a complementary and non-pharmacological method is another pain relief strategy. The Benson relaxation method is more preferred than other methods, because of its simplicity of use and education [19].

Herbert Benson believed that stress reduction is a key element for meditation. Various stress-relieving methods were used in this study indicating that the four basic elements increased dehiscence such as a relaxed environment, a comfortable condition, a mental device such as the word that focuses on it and the inactive attitude [20]. It can create a tranquil environment and reduce muscle tension, heart rate, cortisol secretion, respiratory rate, and blood lactate level, and reduce anxiety [21]. In some studies, the effects of Benson relaxation on the reduction of pain intensity have been reported [19,21]. Accordingly, Benson relaxation is a non-invasive and non-prescriptive therapeutic method for reducing the anxiety levels in burn patients [22,23].

The impact of each intervention separately on the reduction of anxiety in various diseases and burn patients has been satisfactory [16,21,22]. However, no study has compared the effect of these interventions and in combination to show the most effective one. Since nurses can use complementary techniques in clinical settings, research-based evidence is required to compare different complementary methods and determine the most effective intervention [24]. The purpose of this study was to compare the effects of rose aroma inhalation and Benson relaxation and their combination on pain anxiety in burn patients.

2. Methods

2.1. Study design

This randomized clinical trial study with a full factorial experiment design was performed on burn patients referred

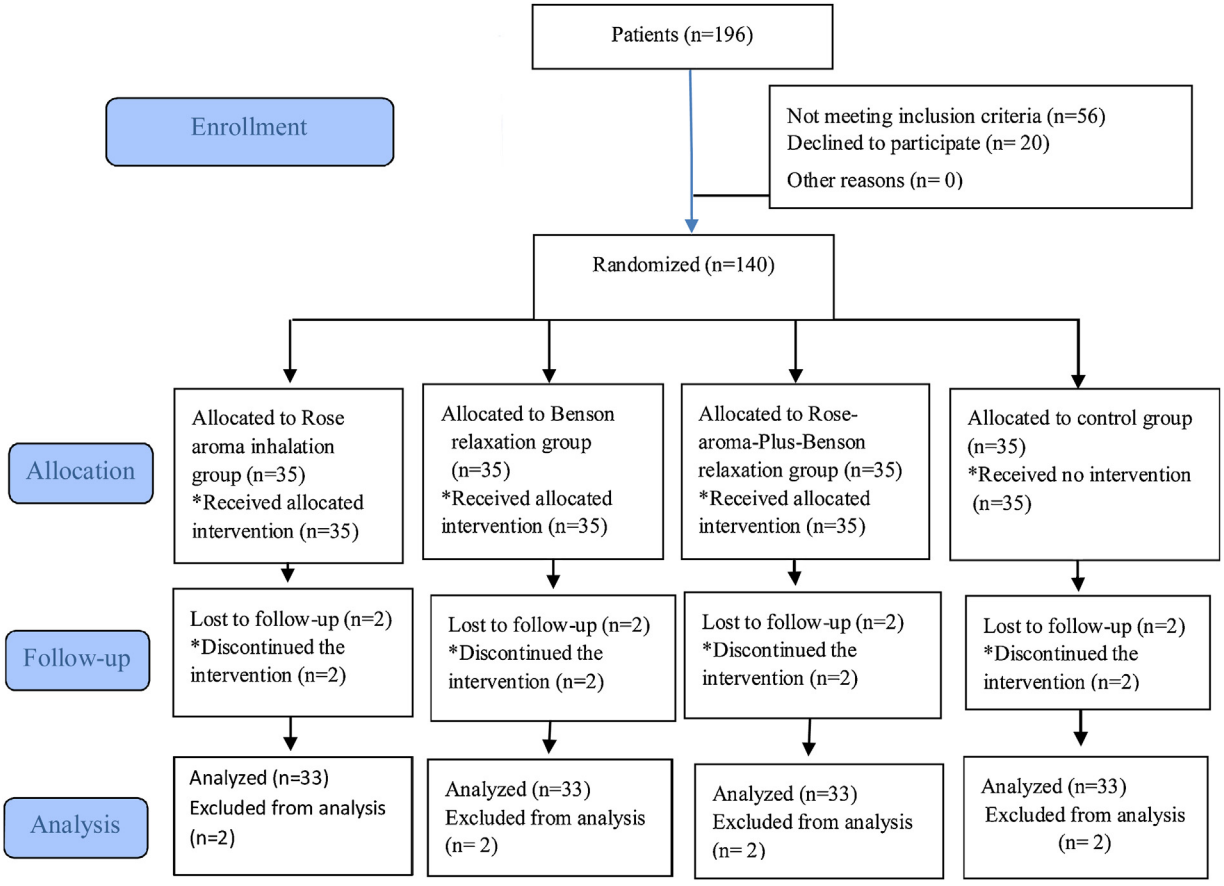

Fig. 1 – Process of the study.

to a burn hospital in Tehran from October 2017 to March 2018. Participants were compared in terms of severity of pain anxiety before and after the interventions (Fig. 1).

2.2. *Sample*

Burn patients were selected using the following inclusion criteria: [1] aged 18–60 years [2], hospitalized in a burn ward after 72 h of burn injury [3], having a second or higher degree burn injury [4], being able to communicate verbally [5], no inhalation, electrical, and intentional burning (self-inflicted burn), and [6] having no cognitive-psychological disorders. Exclusion criteria were those patients that did not continue the intervention, showed the symptoms of allergy to rose aroma, or could not participate in any of the three days of treatment for various reasons such as death, exacerbation of the physical condition, or discharge from the hospital.

The minimum sample size in each intervention and control group was considered 35 using a power formula with $\alpha = 0.05$, power of 80%, 95% confidence interval, and assuming that the effect of rose aroma inhalation and Benson relaxation on pain anxiety in comparison with the control group would be 15 ($d = 15$), and statistically significant. The standard deviation of pain anxiety score based on the Mohammadi Fakhar et al.'s [25] study and scores of 0–100 in intervention groups and control group was estimated to be 22.7 and 19.9, respectively. In this study, 6 patients were reluctant to continue the intervention and 2 patients died, which were excluded from the data analaysis (Fig. 1).

The sequential sampling method was used to recruit samples from two burn wards. Allocation to the groups was performed using the fixed Permuted Block Randomization with a size of 4. Since there was possibility of contaminating the patients of the control and relaxation groups with the rose aroma, patients in two rooms were allocated randomly to four groups, and the same intervention was performed in two other rooms. It means that to prevent the patients in the Benson relaxation and the control groups from receiving aromatherapy, the samples' allocation for two groups of Benson relaxation and control was accomplished from two rooms of each ward and the samples' allocation for the other two groups was accomplished from the other two rooms of the same ward (Fig. 2). Allocation sequences of the groups were written on a card and was placed in opaque packets and inside a folder. A staff nurse that was unaware of the study process selected one packet from the box, and allocated the patients to each group. This process was continued until all cards were selected from the folder, and the desired sample size was achieved. The responsible researchers for data collection were blind to the type of intervention.

Room.no1	Room.no2	Room.no3	Room.no4	Room.no5	Room.no6	Room.no7
Sampling (Rose aroma inhalation group, and Rose arome-Plus-Benson relaxation group)		Sampling (Rose aroma inhalation group, and Rose arome-Plus-Benson relaxation group)		Sampling (Control group and Benson relaxation group)		Sampling (Control group and Benson relaxation group)

Nursing station

Fig. 2 – A schematic of one of wards regarding to randomization.

2.3. *Intervention protocols*

Patients in the control group received routine care. After measurement of pain anxiety, they were asked to rest for 20 min on the bed before wound dressing changes daily for three consecutive days and once a day for 30–45 min.

Besides routine care, the aromatherapy group was asked to inhale 5 drops of aroma of 40% rose (produced by Yas Sepidvash®) for 20 min. It was dropped on a 10 × 10 cm gauze, that was attached the patient's shirt at a distance of 20 cm from patient's nose. It was performed by the researcher for three consecutive days and once a day between 30–45 min before daily wound dressing.

In the Benson relaxation group, this technique was taught to the patients through a lecture by a researcher. The patient's questions about the study process was answered. The instruction of the study process was recorded and made available to the patients via the MP3 player and headphones. The audio file was set to 20 min, so it was not necessary to set the clock to determine duration of the intervention. For muscle therapy, the patient privacy was considered with care. A quiet environment was provided for the patients to sit in a comfortable position on the bed with their eyes closed. They were asked to avoid disturbing thoughts during the intervention, and select a word that always gave them tranquility such as God, love and sea, and began to breathe deeply and regularly. They were asked to inhale and exhale while repeating the word. They were also required to relax their muscle from the tip of their toes through upper muscles of the body and head, so that all muscles would reach full expansion for twenty minutes and opened their eyes and stayed for a while to achieve the desired relaxation. They were allowed to stop the procedure whenever they wished or felt uncomfortable. The intervention was performed for three consecutive days and once a day, for 30–45 min before changing daily dressing under the researcher's supervision. Headphones were disinfected with alcohol cotton to prevent transmission of diseases.

The patients in the group of rose aroma-plus-Benson relaxation technique received a combination of the procedures performed in two other intervention groups simultaneously for 20 min in three consecutive days and once daily, for 30–45 min before daily changing of dressings.

2.4. *Data collection*

Data was collected using the demographic information form and the Farsi version of burn specific pain anxiety scale (BSPAS). The demographic form was completed before the intervention for all patients. Content validity was conducted to assess validity of the questionnaires. Therefore, they were given to an expert panel consisting of experts in the field of research and treatment of burn patients. Necessary amendments were made before their use.

The burn specific pain anxiety scale was the only standard tool that measured pain anxiety in burn patients [26]. The Farsi version of the pain anxiety scale was a self-reported scale for measuring predicted anxiety in burn patients during treatment. A study examined validity and reliability of this questionnaire in Iranian samples, and reported an alpha Cronbach's coefficient of 0.96 [27]. Reliability of this tool was reported as 0.90 in this study. It was consisted of 9 items on the individual's sense of recovery, fear of loss of control during the wound dressing process and pain anxiety during and immediately after treatment such as wound cleaning, wound dressing, debridement and skin graft. Items had a visual scale of 0-10 mm with a range from no anxiety to the worst imaginable status. They identified their responses to each item on a scale from 0 (no anxiety) to 10 (intolerable anxiety), and a researcher that was unaware of the groups' assignment recorded their scores. The final score was the result of the total score of 9 items from 0 to 90 indicating burn pain with a higher score indicating a greater pain anxiety. The burn specific pain anxiety scale (BSPAS) was filled out in three stages in each of the three days by four groups as before the intervention and dressing (Time1 = T1), immediately after the intervention before wound dressing (Time2 = T2) and immediately after wound dressing (Time3 = T3). The patients were asked to specify their responses to each item on the visual analogue scale, and a researcher who was blind to the study process recorded them.

2.5. *Ethical considerations*

The research protocol was approved by the Ethics Committee affiliated with Iran University of Medical Sciences, Tehran (code: IR.IUMS.REC 1396.9511449003). This study was also

registered at the Iranian Registry of Clinical Trials (code: IRCT20171212037843N1). The patients were informed about the purpose, methods, benefits and potential disadvantages of the study. They were ensured of privacy, voluntary participation, and right to withdraw from the study. They also signed the written informed consent form. The latest edition of the Helsinki Ethics Declaration was considered as the ethics guide.

2.6. Data analysis

To examine the normal distribution of data, the Kolmogorov–Smirnov test was used. The Chi-square and Fisher's exact tests were used to compare qualitative variables. One-way analysis of variance (ANOVA) was used to compare quantitative variables between the groups. The Scheffé ad hoc test was used for two by two comparisons of groups in terms of quantitative variables, if the results of ANOVA tests were statistically significant. In each group and on each day, different time intervals for measuring pain anxiety were compared using the repeated measures ANOVA and covariance analysis tests. To assess pain anxiety in different days, the Bonferroni post hoc test was used. To discover whether the independent variable affected the dependent variable, the effect size with a 95% confidence interval was calculated. To measure the effect size, the Cohen's proposed classification was used as 0.2 was considered a small effect size, 0.5 medium, 0.8 large. The significance level was set as $p < 0.05$. Data analysis was carried out via the SPSS software version 16.

3. Results

3.1. Demographic information

Data collected from 132 patients was used for data analysis. The mean (SD) of their age was 42.39 (30.7) years. No statistically significant differences between the groups were reported in terms of demographic characteristics (Table 1). Also, no statistically significant differences between the

Table 1 – Demographic data of the burn patients (n = 132).

Groups / Variables		Benson relaxation (n = 33) N (%)	Rose aroma (n = 33) N (%)	Rose aroma-plus-Benson relaxation (n = 33) N (%)	Control (n = 33) N (%)	Statistical results	P value
Age	Mean ± SD	41.13 ± 52.52	44.10 ± 18.23	44.2 21±.83	40.12 ± 39.45	One way ANOVA F = 0.80	0.49
Gender	Female	6 (18.2)	5 (15.2)	5 (15.2)	7 (21.2)	Chi-squared = 0.57	0.90
	Male	27 (81.8)	28 (84.8)	(8.84)28	26 (78.8)		
Marital status	Married	23 (69.7)	23 (69.7)	25 (75.8)	18 (54.5)	Chi-squared = 3.69	0.29
	Single	10 (30.3)	10 (30.3)	8 (24.2)	15 (45.5)		
Education level	Illiterate	1 (3.0)	5 (15.2)	1 (3.0)	4 (12.1)	Fisher's exact	0.73
	Under diploma	12 (36.4)	9 (24.3)	12 (36.4)	9 (27.3)		
	Diploma	13 (39.4)	13 (39.4)	15 (45.5)	14 (24.4)		
	University	7 (21.0)	6 (18.2)	5 (15.2)	6 (18.2)		
Employment status	Employed	24 (72.7)	28 (84.8)	27 (81.8)	21 (63.6)	Chi-squared= 4.95	0.19
	Unemployed	9 (27.0)	5 (15.2)	6 (18.2)	12 (36.4)		
Income	Sufficient	3 (9.1)	4 (12.1)	4 (12.1)	7 (21.0)	Fisher's exact	0.09
	Insufficient	30 (90.9)	29 (87.87)	29 (87.87)	26 (78.8)		
Cause of burn	Gasoline	6 (18.2)	4 (12.1)	6 (18.2)	8 (24.2)	Fisher's exact	0.57
	Gas	7 (21.0)	6 (18.2)	4 (12.1)	5 (15.2)		
	Fire	14 (42.4)	16 (48.5)	14 (42.4)	9 (27.3)		
	Acid	2 (6.1)	1 (3.0)	0 (0.0)	3 (9.1)		
	Scald	4 (12.1)	4 (12.1)	7 (21.0)	8 (24.2)		
	Contact	0 (0.0)	2 (6.1)	2 (6.1)	0 (0.0)		
Area of burn	Lower limb	10 (30.3)	13 (39.4)	9 (27.3)	12 (36.4)	Chi-squared= 1.36	0.71
	Upper limb	15 (45.5)	15 (45.5)	20 (60.6)	12 (36.4)	Chi-squared= 4.01	0.26
	Head & face	15 (45.5)	13 (39.4)	14 (42.4)	8 (24.2)	Chi-squared= 3.73	0.29
	Body	2 (6.1)	4 (12.1)	2 (6.1)	3 (9.1)	Fisher's exact	0.90
	Posterior	5 (15.2)	1 (3.0)	0 (0.0)	4 (12.1)	Fisher's exact	0.064
	All four limbs	1 (3.0)	3 (9.1)	1 (3.0)	1 (3.0)	Fisher's exact	0.72
	Hands	0 (0.0)	1 (3.0)	1 (3.0)	1 (3.0)	Fisher's exact	0.99
	Anterior	5 (15.2)	1 (3.0)	0 (0.0)	4 (12.1)	Fisher's exact	0.064
TBSA	25≥	20 (60.6)	22 (66.7)	31 (93.9)	16 (48.5)	ANOVA (F = 2.34)	0.07
	>25	13 (39.4)	11 (33.3)	2 (6.1)	17 (51.5)		
	Mean ± SD	25.12 ± 73.39	24.16 ± 82.40	19.5 ± 36.65	26.12 ± 79.66		
Burn degree	2nd degree	15 (45.5)	21 (63.6)	15 (45.5)	11 (33.3)	Fisher's exact	0.95
	3rd degree	12 (36.4)	5 (15.2)	8 (24.2)	8 (24.2)		
	1st & 2nd	2 (6.1)	1 (3.0)	3 (9.1)	3 (9.1)		
	2nd and 3rd	4 (12.1)	6 (18.2)	2 (6.1)	11 (33.3)		

SD = Standard deviation; TBSA = Total body surface area; ANOVA = Analysis of variance.

groups in terms of type of analgesics (p = 0.22) were reported. Except for one patient in the control group, all patients used analgesics.

3.2. *Pain anxiety*

The mean pain anxiety was summarized in Table 2. The patients in all the groups at T1 had a higher level of pain anxiety.

On the first day at T1, the results of one-way ANOVA (Table 2) showed statistically significant differences in the mean scores of pain anxiety in the groups (P < 0.001). The Scheffe ad hoc test indicated where the differences occurred between groups. The Scheffé ad hoc test indicated that before the interventions the mean score of pain anxiety had statistically significant differences between the control and Benson relaxation groups (p = 0.001) and rose aroma-plus-Benson relaxation group (p = 0.002). Furthermore, there were statistically significant differences in terms of the mean score of pain anxiety between the rose aroma group and Benson relaxation groups (P < 0.001) and rose aroma-plus-Benson relaxation group (p < 0.001). No statistically significant difference were reported in the mean pain anxiety scores between the other groups. On the first day at T1, mean pain anxiety score in the Benson relaxation group was the highest and in the rose aroma group was the lowest. On the second day at T1, the one-way ANOVA test (Table 2) showed no statistically significant differences in the mean scores of pain anxiety among four groups (p = 0.15). On the third day at T1, the one-way ANOVA test (Table 2) showed statistically significant differences in the mean scores of pain anxiety among four groups (p = 0.007). The Scheffé ad hoc test indicated that before the interventions the mean score of pain anxiety had statistically significant differences between the Benson relaxation group and rose aroma-plus-Benson relaxation group (p = 0.009). In the rose aroma-plus-Benson relaxation group, the mean pain anxiety score was lower than the Benson relaxation group. No statistically significant difference was reported in the mean pain anxiety scores between the other groups.

On the first day at T2, the Covariance analysis test (Table 2) showed statistically significant differences in the mean scores of pain anxiety among four groups (p < 0.001). On the first day at T2 the Scheffé ad hoc test indicated statistically significant differences in the mean scores of pain anxiety between all groups (p < 0.001), but there were not statistically significant differences between the rose aroma-plus-Benson relaxation and rose aroma groups (p = 0.15). On the second day at T2, the one-way ANOVA test (Table 2) showed statistically significant differences in the mean scores of pain anxiety among four groups (p < 0.001). On the second day at T2, the Scheffé ad hoc test indicated statistically significant differences in the mean pain anxiety score between all groups (p < 0.001). On the third day at T2, the covariance analysis test (Table 2) revealed statistically significant differences in the mean pain anxiety scores among four groups (p < 0.001). On the third day at T2, the Scheffé ad hoc test indicated statistically significant differences in the mean pain anxiety score between all groups (p < 0.001). On the first, second and third days at T2, the least pain anxiety was observed in the groups of rose aroma-plus-Benson relaxation, rose aroma, Benson relaxation and control, respectively.

On the first day at T3, the covariance analysis test (Table 2) showed statistically significant differences in the mean scores

Table 2 – Comparison of the mean scores of pain anxiety within and between the groups in each session (n = 132).

Groups		Day 1 Mean ± SD	Day 2 Mean ± SD	Day 3 Mean ± SD
Benson relaxation (n = 33)	T1	84.76 ± 4.84	81.30 ± 5.69	80.94 ± 4.13
	T2	70.94 ± 6.29	69.94 ± 5.86	68.91 ± 5.15
	T3	67.97 ± 4.57	64.18 ± 2.21	65.97 ± 2.81
	Repeated measures of ANOVA	*F = 219.55	*F = 180.02	*F = 273.58
Rose aroma (n = 33)	T1	78.18 ± 3.02	80.85 ± 5.44	78.27 ± 7.13
	T2	56.61 ± 6.28	63.42 ± 5.06	63.33 ± 3.22
	T3	61.03 ± 2.82	65.12 ± 1.70	63.24 ± 4.79
	Repeated measures of ANOVA	*F = 808.46	*F = 281.29	*F = 71.36
Rose aroma-plus-Benson	T1	84.45 ± 6.33	78.21 ± 8.74	79.85 ± 5.79
Relaxation (n = 33)	T2	53.48 ± 4.69	47.73 ± 8.23	47.27 ± 10.77
	T3	51.42 ± 4.94	45.79 ± 8.72	44.36 ± 6.92
	Repeated measures of ANOVA	*F = 430.37	*F = 332.59	*F = 333.90
Control (n = 33)	T1	79.67 ± 5.33	81.30 ± 5.19	83.27 ± 5.89
	T2	78.12 ± 3.91	77.67 ± 5.09	77.61 ± 5.69
	T3	74.48 ± 5.19	75.36 ± 4.40	74.39 ± 5.90
	Repeated measures of ANOVA	*F = 46.72	*F = 114.31	*F = 58.97
Before the intervention, one way ANOVA test		*F = 14.68	F = 1.75	**F = 4.26
Immediately after the intervention, one way ANOVA test		*F = 154.90	*F = 138.77	*F = 116.09
After dressing, one way ANOVA test		*F = 160.28	*F = 193.23	*F = 186.50

SD = Standard deviation; ANOVA = Analysis of variance; T1 = Before the intervention and dressing (Time1); T2 = Immediately after the intervention before dressing (Time2); T3 = Immediately after dressing (Time3).

* P < 0.001.

** P = 0.007.

of pain anxiety among four groups ($p < 0.001$). The Scheffé ad hoc test revealed statistically significant differences in the mean pain anxiety score between all groups ($p < 0.001$). On the second day at T3, the one-way ANOVA test (Table 2) showed statistically significant differences in the mean scores of pain anxiety among four groups ($p < 0.001$). The Scheffé ad hoc test showed statistically significant differences in the mean pain anxiety score between all groups ($p < 0.001$), except for the rose aroma group and Benson relaxation group ($p = 0.90$). On the third day at T3, the covariance analysis (Table 2) revealed statistically significant differences in the mean pain anxiety scores among four groups ($p < 0.001$). On the third day after wound dressing (T3), the Scheffé test indicated statistically significant differences in the mean pain anxiety score between all groups ($p < 0.001$), except for the rose aroma and Benson relaxation groups ($p = 0.09$). On the first, second and third days at T3, the least pain anxiety was observed in the groups of rose aroma-plus-Benson relaxation, rose aroma, Benson relaxation and control, respectively.

In the control group (Table 2), on the first day, the mean pain anxiety score had statistically significant differences in at least one time-interval compared to the other times ($p < 0.001$). The Bonferroni post hoc test showed that pain anxiety scores significantly decreased at T2 ($p < 0.001$) and also T3 ($p = 0.031$) compared to T1, and this reduction was higher at T3. In addition, the pain anxiety score at T3 had a statistically significant decrease compared to T2 ($p < 0.001$). Also in the control group on the second and third days, statistically significant differences were reported in the mean pain anxiety score in at least one time interval compared to other times ($p < 0.001$). The Bonferroni post hoc test showed that pain anxiety scores decreased significantly on the second and third days at both T2 ($p < 0.001$) and T3 ($p < 0.001$) compared to before the intervention (T1), and this reduction was higher at T3. In addition, the pain anxiety scores of T3 were significantly lower than the T2 on the second day ($p = 0.016$) and the third day ($p = 0.009$).

In the rose aroma inhalation group (Table 2), on the first day, the mean pain anxiety score had statistically significant differences in at least one-time interval compared to the other times ($p < 0.001$). The Bonferroni post hoc test revealed that pain anxiety scores significantly decreased at T2 ($p < 0.001$) and T3 ($p < 0.001$) compared with T1, and this reduction was higher at T2. In addition, the pain anxiety score was lower at T2 compared to T3 ($p = 0.003$). Also in the rose aroma group on the second and third days, statistically significant differences were reported between mean pain anxiety scores in at least one of the time intervals ($p < 0.001$). The Bonferroni post hoc test indicated that pain anxiety scores were significantly decreased at T2 ($p < 0.001$) and also T3 ($p < 0.001$) compared with T1. This reduction was higher on the second day at T2 and on the third day at T3. On the second and third days, no statistically significant differences were reported between T2 and T3.

In the Benson relaxation group, in all the three days, the mean pain anxiety score had statistically significant differences in at least one-time interval compared to the other times ($p < 0.001$). The Bonferroni post hoc test showed that pain anxiety scores were significantly decreased at T3 ($p < 0.001$), as well as T2 ($p < 0.001$) compared to T1, and this reduction was significantly higher at T3. Moreover, on the first, second and third days, the mean pain anxiety scores were significantly decreased at T3 compared to T2 ($p < 0.001$).

In the rose aroma-plus-Benson relaxation group (Table 2), in all the three days, there were statistically significant differences between the mean pain anxiety scores in at least one of the time intervals ($p < 0.001$). The Bonferroni test showed that pain anxiety scores were statistically significant at T2 ($p < 0.001$) and also T3 ($p < 0.001$) compared to T1 and this reduction was higher at T3. Also, on the first, second and third days, no statistically significant differences were reported between the mean pain anxiety scores of T3 in comparison with T2.

In Table 3, effect sizes of the interventions in terms of pain anxiety in the groups of rose aroma inhalation, Benson relaxation, and rose aroma-plus-Benson relaxation were presented at T2 and T3. Since the effect sizes of all groups and times were more than 0.8, the interventions had a significant effect on pain anxiety. At T2, the maximum effect size was on the first day in the group of rose aroma-plus-Benson relaxation and the lowest effect size was on the first day and in the Benson relaxation group. However, at T3 the maximum effect size was on the third day in the rose aroma-pus-Benson relaxation group and the lowest effect size was on the first day and in the Benson relaxation group.

4. Discussion

In all the three days at T1, the mean scores of pain anxiety in all groups were higher and more than the mean scores of BSPAS. The mean score of pain anxiety scores in the study groups at

Table 3 – The effect size of interventions for three days (immediately after the interventions and after dressing changes).

Groups		Benson relaxation	Rose aroma	Rose aroma-plus Benson relaxation
Time/day		Effect size (95% confidence interval)	Effect size (95% confidence interval)	Effect size (95% confidence interval)
Immediately after the intervention	Day 1	1.37 (0.83, 1.90)	4.11 (3.2, 4.96)	5.70 (4.62, 6.79)
	Day 2	1.40 (0.86, 1.94)	2.08 (2.12, 3.48)	4.37 (3.48, 5.26)
	Day 3	1.60 (1.04, 2.15)	3.08 (2.37, 3.8)	3.52 (2.75, 4.29)
After dressing changes	Day 1	1.33 (0.79, 1.86)	3.22 (2.48, 3.95)	4.55 (3.63, 5.46)
	Day 2	3.21 (2.48, 3.94)	3.07 (2.35, 3.78)	4.28 (3.4, 5.15)
	Day 3	1.82 (1.24, 2.39)	2.07 (1.47, 2.67)	4.67 (3.73, 5.60)

T1 indicated that the patients had severe pain anxiety before wound dressing. Patients expect daily treatments of the wound and pain make them feel anxious [28]. Two similar studies showed that the pain anxiety before treatment such as dressing and debridement in burn patients was high [25,29].

According to the results of current study, in all three days at T2, the inhalation of rose aroma alone reduced pain anxiety compared to the control group and the effect size of the rose aroma on pain anxiety was high. Inhaling rose aroma stimulates olfactory stimulant receptors in nose to convert the odor into nerve impulses and send it to the limbic system. Odor can stimulate and release neurotransmitters and endorphins in the brain, which create a pleasant feeling [30]. In a similar study, the mean scores of anxiety and pain were lower in the Lavandula angustifolia group in comparison to the control group [31]. Another study showed that aroma therapy using the essence of Damask rose reduced sympathetic reactions, stabilized vital signs in burn patients and subsequently decreased their anxiety [18]. Also in this study, in all three days at T3, inhalation of rose aroma reduced pain anxiety compared to the control group and the effect of the intervention persisted even after wound dressing. According to a previous study, many patients after inhaling fragrances stated that the rose aroma reminded them of good memories, that distracted them and reduced their anxiety [32]. In this study, after wound dressing, patients' pain anxiety reduced to some extent due to the completion of the procedure. However, the pain anxiety score in the patients at T3 was at a moderate to high level. It can be attributed to the experience of pain by patients. It should be noted that aroma, relaxation or their combination was along with the administration of sedatives; however, the patients with anxiety had a great deal of pain at T3. They may experience anxiety, because of pain prediction for next dressing or other day care procedures. Since there is a relationship between anxiety caused by pain and severity of pain after treatment, patients are more anxious for changing dressings, because of pain, that increases pain anxiety [2].

In this study, in three days at T2 and T3, Benson relaxation reduced pain anxiety in comparison with the control group and the effect of Benson relaxation on pain anxiety was high at these times. Relaxation can reduce muscle tension, heart rate, cortisol release, respiratory rate and blood lactate, which reduce anxiety by creating a tranquil environment [33,34]. Similarly, pain, anxiety and depression levels in burn patients after advanced muscle relaxation and visual intervention were significantly reduced compared to the control group [35]. Another study showed that pain slightly increased during the third time, and patients' pain anxiety in the relaxation group after dressing had a significant decrease compared to before the intervention and dressing [10], which supported the results of our study.

In this study, in three days at T2, inhalation of rose aroma was more effective in reducing pain anxiety compared to the Benson relaxation technique and the effect size of rose aroma on pain anxiety was more than Benson relaxation. In the Benson relaxation technique, due to the expansion of the muscle during intervention [34], pain reduction at the time of dressing changes was less likely to occur in comparison to the rose aroma. According to the results of this study, at T3, inhalation of rose aroma had no statistically significantly difference with Benson relaxation in terms of reducing pain anxiety. The reduction of pain anxiety in the Benson relaxation group was continued at T3, but in the rose aroma inhalation a slight increase was observed in the pain anxiety score. This continuation in the score reduction in the relaxation group led to a similarity of the mean score of pain anxiety with the rose aroma group at T3. This reflects the long-lasting effects of Benson relaxation technique compared to rose aroma. No similar studies on the comparison of these two interventions in terms of the duration of the effect was found. In a study, aromatherapy using Lavandula reduced fatigue in patients undergoing hemodialysis more than Benson relaxation technique [36].

In addition, in all three days at T2 and T3, the combination of two interventions had a greater and synergistic effect on the reduction of pain anxiety compared to rose aroma inhalation, Benson relaxation technique, and control group. The effect size of the rose aroma-plus-Benson relaxation intervention on pain anxiety was high at this time. In this group, the mean pain anxiety was less than the other groups and was within the range of mean scores. Therefore, this combination caused a greater reduction in pain anxiety and continued to persist until T3 compared to the other two methods. Also, in the present study, in all three days at T3 and T2, pain anxiety scores decreased compared to T1, and this reduction was higher at T3. In three days, the mean score of pain anxiety was lower at T3 compared to T2, but it was not statistically significant. It means that at T3, pain anxiety continued to be low, and the combination of two interventions was effective in maintaining anxiety low at T3. One reason for the positive effect of the rose aroma-plus-Benson relaxation technique can be related to the individualized effect mechanism that each intervention has on pain and anxiety. This led to more effective reduction of anxiety when these two interventions were combined. It is believed that rose aroma has a more immediate and stronger effect than relaxation on relieving anxiety. Also, relaxation has a long lasting effect than rose aroma on relieving anxiety. Combining methods causes both immediate and long lasting effects than conducting each one separately. According to the gate control theory of pain, combination of two complementary and non-medical interventions can block more gates and reduce the transmission of pain and anxiety shifts compared to applying each intervention individually. Due to the mutual relationship between pain and anxiety, a high level of pain can affect anxiety. Therefore, nurses can use these interventions to reduce negative feelings such as anxiety and reduce pain [37].

No other studies assessed the synergistic effect of aromatherapy and Benson relaxation technique and their comparison. In a study, the combination of muscle relaxation intervention and visual images led to a greater pain reduction in anxiety of burn patients during rehabilitation exercises compared to relaxation alone [35]. In another study, combination of massage and music interventions had more effects on reducing pain anxiety compared to conducting them separately in burn patients [38]. The combination of music and virtual reality had a positive effect on anxiety prediction, nausea and vomiting of cancer patients undergoing chemotherapy [39]. Also, the combined use of hand massage and inhalation of scents and music therapy had an enhanced effect on the reduction of anxiety and depression in elderly women, and combination of both methods was more effective in the

reduction of pain and music therapy on relieving depression symptoms [40].

5. Limitations

Pain anxiety after the intervention was evaluated only twice. Future studies examine patients' pain anxiety at more time intervals after interventions for determining the long-term effects of interventions. The interventions were only administered for three consecutive days. Further studies are needed to show how long the positive effects will be continued. The current study was conducted on hospitalized patients. Similar studies are needed to evaluate effects of the interventions on patients in outpatient settings and compare them with placebo group through the education of family members about chronic symptoms. In the current study, the pain score was not measured as a confounding factor, which should be considered by future researchers. Another limitation of this study was Hawthorne effect. Participants of research studies may exhibit altered behaviour resulting from awareness of being a part of an experimental study.

6. Conclusion

The results of this study indicated that relaxation, rose aroma and combination of the two interventions reduced severity of pain anxiety in burn patients. The combination of the rose aroma and Benson relaxation has a synergistic effect and is more effective in reducing pain anxiety in burn patients than a single intervention. Due to the ease of application, low cost and no side effects, these complementary therapies can be used for burn patients. In addition, the treatment of pain anxiety in burn patients is very important. The results of this study indicated the possibility of applying these methods and in combination to reduce pain anxiety in patients. Education of these methods to nurses is recommended to empower them in using these interventions in the reduction of pain anxiety in burn patients. Also, the use of complementary therapies can be added to nursing curriculum. There is a need to consider the importance of pain management, anxiety and relaxation management in nursing students and clinical nurses' educational programs to improve quality of care. The effects of these methods can be compared with other complementary methods to determine the more effective method for reducing pain anxiety in burn patients. Also, it is suggested that patients' experiences are studied using the qualitative design to improve our understandings of effects of the interventions.

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Conflict of interest

No conflict of interest is declared by the authors.

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REFERENCES

[1] Van der Heijden MJ, de Jong A, Rode H, Martinez R, van Dijk M. Assessing and addressing the problem of pain and distress during wound care procedures in pediatric patients with burns. Burns 2018;44(February (1)):175–82, doi:http://dx.doi.org/10.1016/j.burns.2017.07.004.

[2] Woo KY. Unravelling nocebo effect: the mediating effect of anxiety between anticipation and pain at wound dressing change. J Clin Nurs 2015;24(July (13–14)):1975–84, doi:http://dx.doi.org/10.1111/jocn.12858.

[3] Griggs C, Goverman J, Bittner EA, Levi B. Sedation and pain management in burn patients. Clin Plast Surg 2017;44(July (3)):535–40, doi:http://dx.doi.org/10.1016/j.cps.2017.02.026.

[4] Bayuo J, Agbenorku P. Nurses' perceptions and experiences regarding Morphine usage in burn pain management. Burns 2015;41(June (4)):864–71, doi:http://dx.doi.org/10.1016/j.burns.2014.10.031.

[5] Akarsu S, Durmuş M, Yapici AK, Öznur T, Öztürk S. Psychiatric assessment and rehabilitation of burn patients. Turk J Plast Surg 2017;25(January (1)):20–7, doi:http://dx.doi.org/10.5152/TurkJPlastSurg.2017.2112.

[6] Ramachandran M, Durairaj AR, Mahipathy SR, Sundaramurthy N. Analysis of psychiatric problems in burn patients in a tertiary burn unit: a prospective study. Int Surg J 2017;4(November (12)):4015–21, doi:http://dx.doi.org/10.18203/2349-2902.isj20175402.

[7] Provençal SC, Bond S, Rizkallah E, El-Baalbaki G. Hypnosis for burn wound care pain and anxiety: a systematic review and meta-analysis. Burns 201823(May), doi:http://dx.doi.org/10.1016/j.burns.2018.04.017 pii: S0305-4179(18)30244-4.

[8] Najafi Ghezeljeh T, Ardebili FM, Rafii F, Haghani H. The effects of patient-preferred music on anticipatory anxiety, post-procedural burn pain and relaxation level. Eur J Integr Med 2017;9(January):141–7, doi:http://dx.doi.org/10.1016/j.burns.2017.01.011.

[9] Woo KY. Chronic wound-associated pain, psychological stress, and wound healing. Surg Technol Int 2012;22(December)57–65 PMID:23023574.

[10] Park E, Oh H, Kim T. The effects of relaxation breathing on procedural pain and anxiety during burn care. Burns 2013;39(September (6)):1101–6, doi:http://dx.doi.org/10.1016/j.burns.2013.01.006.

[11] Lua PL, Salihah N, Mazlan N. Effects of inhaled ginger aromatherapy on chemotherapy-induced nausea and vomiting and health-related quality of life in women with breast cancer. Complement Ther Med 2015;23(June (3)):396–404, doi:http://dx.doi.org/10.1016/j.ctim.2015.03.009.

[12] Bagheri-Nesami M, Shorofi SA, Zargar N, Sohrabi M, Gholipour-Baradari A, Khalilian A. The effects of foot reflexology massage on anxiety in patients following coronary artery bypass graft surgery: a randomized controlled trial. Complement Ther Clin Pract 2014;20(February (1)):42–7, doi:http://dx.doi.org/10.1016/j.ctcp.2013.10.006.

[13] Degirmen N, Ozerdogan N, Sayiner D, Kosgeroglu N, Ayranci U. Effectiveness of foot and hand massage in postcesarean pain control in a group of Turkish pregnant women. Appl Nurs Res 2010;23(August (3)):153–8, doi:http://dx.doi.org/10.1016/j.apnr.2008.08.001.
[14] Ali B, Al-Wabel NA, Shams S, Ahmad A, Khan SA, Anwar F. Essential oils used in aromatherapy: a systemic review. Asian Pac J Trop Biomed 2015;5:601–11, doi:http://dx.doi.org/10.1016/j.apjtb.2015.05.007.
[15] Johnson JR, Rivard RL, Griffin KH, Kolste AK, Joswiak D, Kinney ME, et al. The effectiveness of nurse-delivered aromatherapy in an acute care setting. Complement Ther Med 2016;25 (April):164–9, doi:http://dx.doi.org/10.1016/j.ctim.2016.03.006.
[16] Hur MH, Song JA, Lee J, Lee MS. Aromatherapy for stress reduction in healthy adults: a systematic review and meta-analysis of randomized clinical trials. Maturitas 2014;79 (December (4)):362–9, doi:http://dx.doi.org/10.1016/j.maturitas.2014.08.006.
[17] Safarabadi M. Investigation on the effectiveness inhalation aromatherapy with Lavender essential oil on the anxiety of patients with burns. CMJA 2016;6(December (3)):1583–91.
[18] Bikmoradi A, Harorani M, Roshanaei G, Moradkhani S, Falahinia GH. The effect of inhalation aromatherapy with damask rose (Rosa damascena) essence on the pain intensity after dressing in patients with burns: A clinical randomized trial. Iran J Nurs Midwifery Res 2016;21(May-Jun (3)):247–54, doi:http://dx.doi.org/10.4103/1735-9066.180380.
[19] Rambod M, Sharif F, Pourali-Mohammadi N, Pasyar N, Rafii F. Evaluation of the effect of Benson's relaxation technique on pain and quality of life of haemodialysis patients: a randomized controlled trial. Int J Nurs Stud 2014;51(July (7)):964–73, doi:http://dx.doi.org/10.1016/j.ijnurstu.2013.11.004.
[20] Benson H, Kotch JB, Crassweller KD. The relaxation response: a bridge between psychiatry and medicine. Med Clin North Am 1977;61(July (4))929–38 PMID:327169.
[21] Solehati T, Rustina Y. The effect of Benson relaxation technique in reducing pain intensity among client with post cesarean section. Anesth Pain Med 2015;5(June (3)):e22236, doi:http://dx.doi.org/10.5812/aapm.22236v2.
[22] Varvani FP, Hekmatpou D, Shamsi KS. Effectiveness of muscle relaxation on pain, pruritus and vital signs of patients with burns. Iran J Crit Care Nurs 2013;6(2):87–94.
[23] Delfani F, Zakeri-Moghadam M, Aliha ZM. Effect of muscle relaxation and mental imaginary technics on pain of patients with second-degree burn. Natl J Integr Res Med 2016;7(July/August (4)):17–21.
[24] Ghezeljeh TN, Ardebili FM, Rafii F. The effects of massage and music on pain, anxiety and relaxation in burn patients: randomized controlled clinical trial. Burns 2017;43(August (5)):1034–43, doi:http://dx.doi.org/10.1016/j.burns.2017.01.011.
[25] Mohammadi Fakhar F, Rafii F, Jamshidi Orak R. The effect of jaw relaxation on pain anxiety during burn dressings: randomized clinical trial. Burns 2013;39(February (1)):61–7, doi:http://dx.doi.org/10.1016/j.burns.2012.03.005.
[26] Taal LA, Faber AW. Post-traumatic stress, pain and anxiety in adult burn victims. Burns 1997;23(November (7–8))545–9 PMID:9568321.
[27] Ghezeljeh TN, Ardebili FM, Rafii F, Hagani H. Translation and psychometric evaluation of Persian versions of burn specific pain anxiety scale and impact of event scale. Burns 2013;39 (September (6)):1297–303, doi:http://dx.doi.org/10.1016/j.burns.2013.02.008.
[28] Mendoza A, Santoyo FL, Agulló A, Fenández-Cañamaque JL, Vivó C. The management of pain associated with wound care in severe burn patients in Spain. Int J Burns Trauma 2016;6 (January (1))1–10 PMID: 27069760.
[29] Dehghani M, Hakimi H, Mousazadeh S, Zeynali J, Samimian S. The Relationship between Pain and Anxiety throughout dressing among burn patients. J Holist Nurs Midwifery 2014;24 (4):30–7.
[30] Tamaki K, Fukuyama AK, Terukina S, Kamada Y, Uehara K, Arakaki M, et al. Randomized trial of aromatherapy versus conventional care for breast cancer patients during perioperative periods. Breast Cancer Res Treat 2017;162(April (3)):523–31, doi:http://dx.doi.org/10.1007/s10549-017-4134-7.
[31] Seyyed-Rasooli A, Salehi F, Mohammadpoorasl A, Goljaryan S, Seyyedi Z, Thomson B. Comparing the effects of aromatherapy massage and inhalation aromatherapy on anxiety and pain in burn patients: a single-blind randomized clinical trial. Burns 2016;42(December (8)):1774–80, doi:http://dx.doi.org/10.1016/j.burns.2016.06.014.
[32] Kheirkhah M, Pour NS, Nisani L, Haghani H. Comparing the effects of aromatherapy with rose oils and warm foot bath on anxiety in the first stage of labor in nulliparous women. Iran Red Crescent Med J 2014;16(September (9)):e14455, doi:http://dx.doi.org/10.5812/ircmj.14455.
[33] Büyükyılmaz F, Aştı T. The effect of relaxation techniques and back massage on pain and anxiety in Turkish total hip or knee arthroplasty patients. Pain Manag Nurs 2013;14(September (3)):143–54, doi:http://dx.doi.org/10.1016/j.pmn.2010.11.001.
[34] Poorolajal J, Ashtarani F, Alimohammadi N. Effect of Benson relaxation technique on the preoperative anxiety and hemodynamic status: a single blind randomized clinical trial. Artery Res 2017;17(March):33–8, doi:http://dx.doi.org/10.1016/j.artres.2017.01.002.
[35] Khanolkar TS, Metgud S, Verma C. A study on combined effects of progressive muscle relaxation and visual imagery technique on perceived pain, levels of anxiety and depression in patients with burns. Indian J Physiother Occup Ther 20137 (April (2)).
[36] Hassanzadeh M, Kiani F, Bouya S, Zarei M. Comparing the effects of relaxation technique and inhalation aromatherapy on fatigue in patients undergoing hemodialysis. Complement Ther Clin Pract 2018;31(May):210–4, doi:http://dx.doi.org/10.1016/j.ctcp.2018.02.019.
[37] Jones T, Skadberg R, Moore T. A pilot study of the impact of repeated sessions of virtual reality on chronic neuropathic pain. Int J Virtual Real 201818(January (1)).
[38] Ghezeljeh TN, Ardebili FM. Comparing the effect of patients preferred music and Swedish massage on anticipatory anxiety in patients with burn injury: randomized controlled clinical trial. Complement Ther Clin Pract 2018;32(August):55–60, doi:http://dx.doi.org/10.1016/j.ctcp.2018.05.002.
[39] Karagozoglu S, Tekyasar F, Yilmaz FA. Effects of music therapy and guided visual imagery on chemotherapy-induced anxiety and nausea–vomiting. J Clin Nurs 2013;22(January (1–2)):39–50, doi:http://dx.doi.org/10.1111/jocn.12030.
[40] Choi N. The effects of hand massage using aroma essential oil and music therapy on anxiety and sleeping for elderly women in the sanatorium. Int J Bio Sci Bio Technol 2014;7(5):151–8.