Effects of Essential Oil Extracted from Herb on Job Stress, Depression and Fatigue of Hospital Workers

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ABSTRACT

This study was implemented to verify effectiveness related to job stress, depression or fatigue of hospital workers, by let them wearing necklaces with essential oils injected which were extracted from herb plants, as an alternative therapy. For this study, totally 60 people were selected who work in K hospital located in D city, in accordance with their agreement with participation in, and who were divided into 30 and 30 for a control group and an experimental group as appropriate subjects. The study was followed for 2 weeks from June 29 of 2015 by July 10 of 2015, by letting the experimental group wearing essential oils necklaces with a distance of 20 cm from noses during working time for 8 hours per day. After inhaling essential oils by wearing the necklaces, the job stress status didn't have obvious difference between two groups statically, such as 104.1 ± 11.3 points from 101.2 ± 10.3 points for the control group and 104.7 ± 9.8 points from 104.9 ± 9.0 points for the experimental group. In case of the depression status, the control group had no difference such as 28.8 ± 8.0 points from 29.4 ± 9.0 points, and the experimental group had small decrease with 0.017 points such as 26.6 ± 5.3 points from 28.5 ± 5.6 points. In case of the fatigue status, the control group had no difference such as 75.7 ± 19.7 points from 72.0 ± 19.0 points, and the experimental group had small decrease with 0.049 points such as 64.3 ± 20.0 points from 70.5 ± 19.0 points.

Keywords: alternative, herb plants, necklaces, therapy

Introduction

According to a social survey, 66.6% of the entire population in Korea is suffering from stress, and 72.9% of stress is caused by their life at work (Statistics Korea, 2014). Stress can be encountered by anyone, and for workers that spend a great part of the day at work, workplace serves as a key factor of stress in addition to a means of self-achievement and life. The right amount of stress creates certain tension and motivates individuals to grow and increase productivity, but too much stress may not only damage an individual's physical and mental health, but also cause neglect of duty, faults and absence from work. Furthermore, it causes various mental and behavioral responses, and if the level is severe or exceeds the point where the individual can adjust, it may result in mental illness and physical diseases. Severe stress also mentally affects individuals and cause symptoms of depression, and threatens mental health so much that it may even lead to suicide (Yu, 2010).

Received: February 22, 2017, **Revised:** May 26, 2017, **Accepted:** September 22, 2017

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A hospital deals with life, death and the process of dying, which exposes its workers to a great deal of job stress. Due to the increase of the government's various regulation policies, intensified competition among medical institutions, changes in national consciousness and IT development, hospitals are becoming more enlarged and specialized. The increasing average lifespan changes the medical trend to prevention of disease, and the increasing cosmetic treatments and diversity of needs from contact with guardians, customer satisfaction and complaints are all increasing job stress for medical personnel or paramedics such as doctors, nurses, medical technicians, and nurse aides. In other words, health workers are experiencing much more job stress than others (Kim and Suh, 2011). Recently, with the improvement of service quality and higher demand for patient satisfaction, efforts are required to regulate and control emotional expressions when providing service for patients, and this emotional pain is considered a certain labor that has also began to be perceived important. Such job stress of hospital workers is accompanied by depression and fatigue, which ultimately leads to lower quality of life, increase in turnover rates, and deteriorated quality of medical services.

Therefore, to apply aroma therapy that is known as an alternative therapy for hospital workers, this study had hospital workers wear a necklace injected with essential oil extracted from herbs, and examined the effects of its aroma on their job stress, depression and fatigue.

Research Method

Experimental design

This study adopted the nonequivalent control-group pretest-posttest design to test the effect of inhaling the aroma by wearing necklaces with essential oil extracted from herbs on work stress, depression and fatigue of hospital workers. Both the control group and experimental group had their general characteristics surveyed in advance, after which their job stress, depression and fatigue were measured. The control group did not undergo any treatment, while the experimental group was to inhale the aroma by wearing necklaces with essential oil extracted from herbs. After the treatment, both groups had their job stress, depression and fatigue measured at the same point of time in the same method as before.

Subjects

To determine the effect of essential oil extracted from herbs on job stress, depression and fatigue of hospital workers, this study selected total 60 subjects — 30 each for the control group and experimental group — as the final subjects. The subjects are ordinary workers at K University Hospital in D city that agreed to participate in this study, and who have no hypersensitive or allergic reaction to aromas, have nothing wrong with olfactory sense, do not take drugs like antidepressants, and are not receiving other treatment such as exercise or yoga.

Research tool

Inhaling tool

Aroma necklaces were used as the tool to inhale the aroma of essential oil. The necklaces are easy to carry around and can be inhaled immediately in cases of stress by carrying them around at work (Oh, 2012). For convenience, the necklaces have adjustable straps, and the necklaces and pendants had five options in colors similar to their working clothes to avoid distraction at work. To consistently inhale the aroma of essential oil during the experiment, the length of the necklace was adjusted to keep a 20 cm distance between the nose and the pendant, with reference to a previous study on the effect of aroma therapy using necklaces on the changes in stress and autonomic nervous system of nursing students in clinical training (Kim et al., 2014), and a study on the effect of aroma pads on stress, fatigue and depression of nurses in operating rooms (Lee, 2012).

Essential oil

The essential oils extracted from herbs used as ingredients are top note bergamot (*Citrus bergamia* (origin; Italy) 100%, English Kerfoot), middle note lavender (*Lavendula angustifolia* (origin; Bulgaria) 100%, Helga Stolz GmbH), and base note sandalwood (*Santalum album* (origin; India) 100%, Australian Kerfoot). The main ingredients of bergamot are esters (Linalyl acetate) and monoterpenes (Limonene) that lift the mood, and thus it is one of the oils that are most preferentially used to relieve depression. The main ingredients of lavender are esters (Linalyl acetate) and alcohols (Linalol) for soothing and relaxing, which are effective for stress, anxiety, insomnia and headaches suffered by people today. The main ingredient of sandalwood is alcohols (Cis- α -santalol, Cis- β -santalol) with almost no toxicity or irritation, and that give active vitalization (Sakong and Kim, 2006). To avoid phased release according to volatility, bergamot, lavender and sandalwood are blended in the ratio of 3:2:1 and matured for 1 week, after which the oils were injected into the aroma necklaces for the subjects in the experimental group to wear. Table 1 shows the main ingredients and blending ratios of the oils.

Study period

This study was conducted for 38 days from June 8 to July 15, 2015 in the order of pretest, oil blending and maturing, aroma experiment, and posttest. The experimental group wore the necklaces for 2 weeks from June 29 to July 10,

Evaluation tool

The pretest was conducted to determine the general characteristics of the subjects, and their job stress, depression and fatigue were examined before and after the experiment to determine to effect of essential oil. All evaluations were done by the subjects through self-testing.

(1) Job stress

The tool developed by Chang et al. (2005) in Korea Occupational Safety & Health Agency was used in this study. This tool consists of total 43 items in 8 categories about job stress, such as physical environment, job demand, job autonomy, relationship conflict, job insecurity, organizational management system, inappropriate compensation, and workplace culture. Each item is rated on a four-point scale (4 points for highest stress and 1 point for lowest stress), with higher scores indicating relatively higher stress. The reliability was Cronbach's $\alpha=.785$.

(2) Depression

The Beck Depression Inventory (BDI) by Beck et al. (1961) is a self-report questionnaire consisting of total 21 items.

Table 1. Main ingredients and blending ratio of oils for this study.

Aroma oil	Sort	Origin	Extracted parts	Extraction method	Main chemistry ingredients	Ratio
Bergamot	Top note	Italy	Peel of fruits	Expression	Linalyl acetate 32%, Limonene 33%, Linalool 14%, Bergaptene 0.23%	3
Lavender	Middle note	Shore of the Mediterranean	Surrounding buds	Steam distillation	Linalyl acetate 46.71~53.80%, Linalool 29.3~41.62%, Camphor 0.3%	2
Sandalwood	Base note	India	Trunk, root	Steam distillation	Santalol 70~90%, Borneol 5%	1

This study used the Korean version of the BDI adapted by Lee et al. (1995). The BDI comprehensively measures cognitive, emotional, motivational and physical symptoms as well as decreased self-esteem. Each item is rated on a scale of 0-3, which can be distributed from 0 to 63. Higher scores indicate greater depression. The reliability was Cronbach's $\alpha = .906$.

(3) Fatigue

Fatigue was measured with the Multidimensional Fatigue Scale (MFS) restructured by Chang (2000) with sub-factors such as overall fatigue level, daily life dysfunction, situational fatigue, sleep, and sensitivity to relaxation, based on the FAI (Fatigue Assessment Inventory) developed by Schwartz et al. (1993) with verified reliability and validity. MFS consists of total 19 items such as 8 items in overall fatigue including "I lack efficiency in time-consuming tasks when exhausted," 6 items in daily life dysfunction including "I feel drowsy and sleepy when exhausted," and 5 items in situational fatigue including "I feel exhausted when stressed." They were rated on a seven-point scale (strongly disagree 1-2-3-4-5-6-7 strongly agree), and the greater the sum of scores in each factor, the higher the level of fatigue. The reliability was Cronbach's $\alpha = .923$.

Data analysis

Collected data were statistically analyzed using SPSS WIN 18.0, and the homogeneity between the two groups (control and experimental) was analyzed by an independent t-test. Pretest-posttest changes in job stress, depression and fatigue within the groups were analyzed by a paired t-test.

Research procedures

This study was conducted in the order of pre-test, experiment and post-test after the pre-survey to determine the effect of essential oil extracted from herbs on job stress, depression and fatigue of hospital workers. To conduct this study, the researchers received education and training in aroma instructor course about the objective of this study, data collection method and how to inhale aroma from necklaces from May 12 to June 17, 2015, and also received the Aroma Instructor Course Level 2 license from the Korea Aromatherapy Instructor Association. Essential oils to relieve job stress, depression and fatigue were selected based on literature review (Kwan et al., 2008; Sakong and Kim, 2006). Aroma-related research data were analyzed and advice was sought from 1 aroma therapy expert and 1 principal researcher at a local community herb research center to blend the top, middle and base note into the ratio of 3:2:1. To determine whether the aroma necklace inhaling method is suitable for hospital workers, a preliminary test was held on 4 workers who inhaled the necklaces according to the method and recorded inconveniences for modification and improvement.

The pretest first surveyed the general characteristics using a questionnaire in the experimental group that suits the objective of this study, after which job stress, depression and fatigue were measured. The same was done for the control group. The control group and experimental group were randomly formed and measured with the same ratio of departments among the ordinary workers with the same working patterns to secure reliability of the effect. First, the researchers explained the objective and content of the study to the subjects before inhaling the aroma, and the subjects filled out the questionnaire after providing written consent. The questionnaire was explained further when necessary.

Aroma is not accumulated in the body but is discharged through respiratory organs, liver and kidneys, but using the same aroma for 3 weeks to 3 months may accumulate toxicity on liver or kidneys, and thus it is necessary to take a break for at least a week or use different aromas (Oh, 2002). Therefore, this study was conducted for 2 weeks according to the

expert advice and the schedule of the experimental group, and the subjects were to wear the necklaces only at work so that the experimental environment can be controlled. Moreover, the researchers distributed the guidelines for the experiment to the experimental group so that the subjects do not forget to wear the necklaces, and also provided a text message notification service every day to wear the necklaces.

In the posttest, the researchers measured stress, depression and fatigue with a questionnaire for both groups in the same method, and added a survey on experiment satisfaction for the experimental group. For the control group, aroma necklaces with the same blend of aroma essential oil used on the experimental group were provided as a gift after the study for ethical fairness and gratitude, along with training about how to use them. Fig. 1 shows the detailed activities in each procedure.

Results and Discussions

General characteristics of subjects

To determine the effect of essential oil extracted from herbs on job stress, depression and fatigue of hospital workers,

Stage	Activity details	Period
Pre-survey	General characters, job stress, depression, fatigue	2015.06.08
↓	↓	↓
Selection of oils	As blended oils, bergamot, lavender, sandalwood were selected	2015.06.10
↓	↓	↓
Blending oil	Blending ratio: bergamot:lavender:sandalwood = 3:2:1	2015.06.12
↓	↓	↓
Maturing	Maturing oils for 1 week	2015.06.19
↓	↓	↓
Injection into necklace	The blended oils were injected into 5 types of necklaces by each 1 ml, which have been separated by 5 colors.	2015.06.26
↓	↓	↓
Pre-test	Pre-test was followed to verify discomfort or side effects	2015.06.26
↓	↓	↓
Experiment beginning	The experimental group put on the necklace adequate colored to their working uniforms, which kept 20cm distance from a nose, and which were used for 8 hours per day (9h~17h, working time). They were given experimental survey guides for participants, and event or stress status documents, and were encouraged to fill them by texts every morning.	2015.06.29
↓	↓	↓
Experiment completion of the experimental group	The experiment of the experimental group completed and the necklaces were collected	2015.07.10
↓	↓	↓
Post-survey	Study satisfaction or post survey (job stress, depression, fatigue) was implemented	2015.07.10
↓	↓	↓
Completion	As a form of appreciation, all of participants were regiven necklaces after being refilled, who were not only an experimental group, but also a comparison group.	2015.07.15

Figure 1. Detailed activity by research procedures.

Table 2. General characteristics of study subjects.

Characteristics	Sort	Total	Cont. (n=30)	Exp. (n=30)
		n (%)	n (%)	n (%)
Age	20s	4 (6.7)	4 (6.7)	0 (0)
	30s	16 (26.7)	11 (18.3)	5 (8.3)
	40s	26 (43.3)	10 (16.7)	16 (26.7)
	50s	14 (23.3)	5 (8.3)	9 (15)
Gender	Male	8 (13.3)	4 (6.7)	4 (6.7)
	Female	52 (86.7)	26 (43.3)	26 (43.3)
Final academic background	Highschool	4 (6.7)	3 (5)	1 (1.7)
	College	35 (58.3)	19 (31.7)	16 (26.7)
	University for 4 years	13 (21.7)	5 (8.3)	8 (13.3)
	More than Master degree	8 (13.3)	3 (5)	5 (8.3)
Marriage status	Married	50 (83.3)	23 (38.3)	27 (45)
	Unmarried	10 (16.7)	7 (11.7)	3 (5)
Religion	Yes	34 (56.7)	13 (21.7)	21 (35)
	No	26 (43.3)	17 (28.3)	9 (15)
Monthly earning	under 300	27 (45)	20 (33.3)	7 (11.7)
	more than 300	33 (55)	10 (16.7)	23 (38.3)
Smoking	Yes	2 (3.3)	2 (3.3)	0 (0)
	No	58 (96.7)	28 (46.7)	30 (50)
Coffee intake	Yes	8 (13.3)	5 (8.3)	3 (5)
	No	52 (86.7)	25 (41.7)	27 (45)
Drinking	Yes	35 (58.3)	18 (30)	17 (28.3)
	No	25 (41.7)	12 (20)	13 (21.7)
Healthy status	Very healthy	5 (8.3)	5 (8.3)	0 (0)
	Healthy	26 (43.3)	13 (21.7)	13 (21.7)
	Normal	27 (45)	11 (18.3)	16 (26.7)
	Not healthy	1 (1.7)	1 (1.7)	0 (0)
	Not healthy too much	1 (1.7)	0 (0)	1 (1.7)
Taking medicines	Yes	16 (26.7)	9 (15)	7 (1.7)
	No	44 (73.3)	21 (35)	23 (38.3)
Menstruation status	Regularly	32 (53.3)	19 (31.7)	13 (21.7)
	Irregularly	8 (13.3)	2 (3.3)	6 (10)
	Menopause	12 (20)	5 (8.3)	7 (11.7)
	Male	8 (13.3)	4 (6.7)	4 (6.7)
Losing weight	Yes	6 (10)	3 (5)	3 (5)
	No	54 (90)	27 (45)	27 (45)
Life satisfaction	Satisfied	33 (55)	19 (31.7)	14 (23.3)
	Usual	24 (40)	10 (16.7)	14 (23.3)
	Unsatisfied	3 (5)	1 (1.7)	2 (3.3)
Occupation type	Medical technicians	15 (25)	6 (10)	9 (15)
	Nurses	38 (63.3)	17 (28.3)	21 (35)
	General administrations	7 (11.7)	7 (11.7)	0 (0)

this study examined total 60 subjects, 30 each for the control group and experimental group. Table 2 shows the general characteristics of the subjects. By gender, 13.3% were men and 86.7% were women. 6.7% were in their 20s, 26.7% in their 30s, 43.3% in their 40s, and 23.3% in their 50s. This indicates that there were 6 times more women than men, and 66.6% were in their 40s or older. Most of them were college graduates (58.3%), followed by 4-year university graduates (21.7%), masters or higher (13.3%), and high school graduates (6.7%). 83.3% were married, and 56.7% had a religion. 45% had a monthly income lower than 3 million KRW and 55% had 3 million KRW or higher. 3.3% were smokers, 13.3% had coffee intake, and 58.3% was drinking. As for satisfaction in life, 55% were satisfied, 40% were neutral, and 5% were unsatisfied. By occupation, 25% were medical technicians, 63.3% were nurses, and 11.7% were in general administration.

Between-group test for homogeneity

To determine the effect of wearing aroma necklaces with essential oil extracted from herbs on job stress, depression and fatigue of hospital workers, an experiment was conducted in two groups, control and experimental. Table 3 shows the result of data analysis with an independent t-test on job stress, depression and fatigue to determine the homogeneity of the two groups.

In the case of job stress, the control group had an average score of 101.2 ± 10.3 and the experimental group had 104.9 ± 9.9 , showing no statistically significant difference ($p=.151$). For depression, the control group had 29.4 ± 9.0 and the experimental group had 28.5 ± 5.6 , showing no statistically significant difference ($p=.657$). For fatigue, the control group had 72.0 ± 18.9 and the experimental group had 70.5 ± 19.0 , showing no statistically significant difference ($p=.771$).

As a result, there was no statistically significant difference in all items of job stress, depression and fatigue between the two groups before the experiment, thereby confirming that the two groups are homogeneous.

Within-group pre-post test changes

To determine the effect of wearing aroma necklaces with essential oil extracted from herbs on job stress, depression and fatigue of hospital workers, this study conducted a measurement of the two groups once each before and after the experiment, based on which the changes in job stress, depression and fatigue are examined.

Changes in job stress

Table 4 shows the result of analyzing the changes in job stress for the two groups with a paired t-test. For the control group, job stress had no statistically significant difference from average 101.2 ± 10.3 to 104.1 ± 11.3 ($p=0.086$), and the experimental group wearing the aroma necklaces with essential oil extracted from herbs also had no statistically

Table 3. Pre-equivalence study between the comparison group and the experimental group.

Item	Cont. (n=30) (score)	Exp. (n=30) (score)	t	p
Job stress	101.2 ± 10.3^z	104.9 ± 9.9	-1.454	.151 ^{NS}
Depression	29.4 ± 9.0	28.5 ± 5.6	.447	.657 ^{NS}
Fatigue	72.0 ± 18.9	70.5 ± 19.0	.293	.771 ^{NS}

^zMean±standard deviation.

^{NS}Non significant at $p<.05$ by independent t-test.

Table 4. Statistic analysis of job stress changes of hospital workers after inhaling essential oils by wearing necklaces.

Group	Pre-test (score)	Post-test (score)	t	p
Cont. (n=30)	101.2±10.3 ^z	104.1±11.3	-1.779	0.086 ^{NS}
Exp. (n=30)	104.9±9.0	104.7±9.8	0.185	0.855 ^{NS}

^zMean±standard deviation.^{NS}Non significant at $p<.05$ by paired t-test.

significant difference from average 104.9±9.0 before experiment to 104.7±9.8 after ($p=0.855$). This is similar to the study by Oh (2012) on female production workers working in shifts and the study by Choi and Lee (2012) on patients with essential hypertension, both of which claimed that there was no statistical difference between the two groups after aroma experiment. However, studies by Sung (2005) and Lee (2012) on nurses in operating rooms applying aroma inhalation claimed that there was a positive change in stress, and the study by Jang (2009) on nurses in emergency rooms also argued that there was a significant difference between the two groups and aroma was effective on reducing job stress.

This study failed to obtain such effect on job stress because all hospitals were in emergency due to MERS-CoV during the study period, and the relevant hospital was designated as an intensive medical center for the disease, while at the same time it was also the medical audit period. Furthermore, there were 34 days of labor-management strike and conflicts against the reckless management of public institutions of national university hospitals. These circumstances constantly increased stress factors, but this study limited the experiment only to working hours to inhale the aroma, which may have limited the effect on reducing job stress.

Changes in depression

Table 5 shows the result of analyzing the changes in depression for the two groups with a paired t-test. For the control group, depression had no statistically significant difference from average 29.4±9.0 to 28.8±8.0 ($p=0.486$), but the experimental group wearing the aroma necklaces with essential oil extracted from herbs showed a statistically significant ($p=0.017$) decrease of depression from average 28.5±5.6 to 26.63±5.3 after the experiment. This is similar the study by Lee (2012) on nurses in the operating rooms applying aroma inhalation, proving that it reduced stress, fatigue and depression of the nurses and enabled them to work in a more relaxing state. It is also consistent with the study by Oh (2012) on female production workers working in shifts, where aroma roll-on inhalation showed a significant effect on decreasing depression and improving sleep state. The oils used in this study are bergamot to lift up the mood and relieve depressed feelings and lavender to soothe and relax the mind, which are both effective for stress, anxiety, insomnia and headaches (Sakong and Kim, 2006). As such, essential oils extracted from herbs are used as a therapy to relax and vitalize the body and soul of the subjects.

Table 5. Statistic analysis of depression changes of hospital workers after inhaling essential oils by wearing necklaces.

Group	Pre-test (score)	Post-test (score)	t	p
Cont. (n=30)	29.4±9.0 ^z	28.8±8.0	0.706	0.486 ^{NS}
Exp. (n=30)	28.5±5.6	26.6±5.3	2.530	0.017*

^zMean±standard deviation.^{NS}Non significant or significant * $p<0.05$ by paired t-test.

Changes in fatigue

Table 6 shows the result of analyzing the changes in fatigue for the two groups with a paired t-test. For the control group, fatigue had no statistically significant difference from average 72.0 ± 18.9 to 75.7 ± 19.7 ($p=0.156$), but the experimental group wearing the aroma necklaces with essential oil extracted from herbs showed a statistically significant ($p=0.049$) decrease of fatigue from average 70.5 ± 19.0 to 64.3 ± 20.0 after the experiment. This is consistent with the study claiming that aroma therapy reduces fatigue in nurses working in operating rooms and allows them to work in a more relaxed state, and that it can be an alternative therapy to increase work efficiency (Lee, 2012). It is also consistent with the study on nursing students in their first clinical training, which claimed that fatigue decreased after inhaling aroma through necklaces (Kang and Kim, 2002). The main ingredient of lavender and bergamot used in this study is ester (Linalyl acetate), which soothes and comforts the mind, thereby relaxing inner muscles. The balm used in aroma therapy promotes metabolism and naturally treats stress and diseases without side effects (Sakong and Kim, 2006).

This study is conducted to examine the effect of essential oil on job stress, depression and fatigue of hospital workers after wearing necklaces with essential oil extracted from herbs for 2 weeks. It was designed so that the subjects are to wear aroma necklaces that are easy to carry at work, so that they can immediately inhale the aroma in case of stress, which is an improved method suggested in previous research (Oh, 2012). The hospital workers put the necklaces on immediately after they got to work and kept them on until they got off work, but this failed to maintain the continuity of the experiment due to the five-day workweek system. Moreover, since the study was conducted without controlling external factors such as MERS-CoV and labor-management strike, there was difficulty in objectifying the level of job stress, depression and fatigue of hospital workers. Therefore, this study has limitations in generalizing the results and verifying that the same effect will be produced after conducting the same experiment on workers of other hospitals.

It is necessary to conduct research on methods to reduce job stress, depression and fatigue of hospital workers and on various programs to improve the quality of their lives. The inhalation method by wearing aroma necklaces also requires some improvement. A replication study must be conducted so that the subjects can select the aroma of their choice in light of their preferences for fragrances, and follow-up research must be designed to have the subjects wear the aroma necklaces everywhere except for sleeping hours, instead of limiting only to working hours. Furthermore, the experiment should be conducted for at least 3-4 weeks, and the same shape of tool must be used because the size of the hole in the pendant may give off different intensity of aroma.

This study applied aroma therapy by controlling the subjects to ordinary hospital workers, but it can be improved by expanding the scope of subjects to shift workers, clinical nurses and workers in special departments. Different application methods and research designs can also be used to verify the effect. More systematic and diverse studies are anticipated with regard to aroma therapy including changes in chemical numbers of essential oil that can objectively verify the inhalation of aroma necklaces.

Table 6. Statistic analysis of fatigue degree changes of hospital workers after inhaling essential oils by wearing necklaces.

Group	Pre-test (score)	Post-test (score)	t	p
Cont. (n=30)	72.0 ± 18.9^z	75.7 ± 19.7	-1.455	0.156 ^{NS}
Exp. (n=30)	70.5 ± 19.0	64.3 ± 20.0	2.055	0.049*

^zMean±standard deviation.

^{NS}Non significant or significant * $p < 0.05$ by paired t-test.

Conclusion

To determine the effect of wearing aroma necklaces with essential oil extracted from herbs as an alternative therapy on job stress, depression and fatigue of hospital workers, this study selected total 60 subjects — 30 each for the control group and experimental group — as the final subjects. The subjects are ordinary workers at K University Hospital in D city that agreed to participate in this study who meet the study requirements. The experimental group wore necklaces with the pendants containing essential oil extracted from herbs hanging at a 20cm distance from the nose during working hours (8 hours a day) for 2 weeks from June 29 to July 10, 2015. After the experiment, job stress changed from 101.2 ± 10.3 to 104.1 ± 11.3 in the control group, and 104.9 ± 9.0 to 104.7 ± 9.8 in the experimental group, showing no statistically significant difference in both groups. Depression did not show a significant change in the control group from 29.4 ± 9.0 to 28.8 ± 8.0 , whereas it decreased significantly from 28.5 ± 5.6 to 20.5 ± 19.0 in the experimental group ($p=.017$). Fatigue had no significance in the control group from 72.0 ± 19.0 to 75.7 ± 19.7 , whereas it decreased significantly from 70.5 ± 19.0 to 64.3 ± 20.0 in the experimental group ($p=.049$). This shows that essential oil extracted from herbs is effective in reducing depression and fatigue of ordinary workers at hospitals. However, even though the study was designed to immediately inhale the aroma in cases of stress by carrying it around at work, the continuity of experiment could not be maintained due to the five-day workweek system as well as environmental factors (internal and external) in the hospital during the research. Therefore, there is a need for more systematic research on aroma therapy that is recently receiving spotlight as an alternative therapy by solving these problems.

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