The Effects of Aroma Massage and Regular Oil Hand Massage on the Blood Cortisol and Serotonin Level of Elderly

Hyun Suk Kim¹*, Suk Hee Kim², Yeon Suk Park³ and Mi Young Kim⁴

¹Department of Nursing Science, Kunsan College of Nursing ²Bongjung Elderly Nursing Homes, Kunsan College of Nursing ³Department of Nursing Science, Kongju National University ⁴Department of Nursing Science, College of Health Science, Ewha Womans University ¹*khs@kcn.ac.kr, ²crocus56@hanmail.net, ³yspark@kongju.ac.kr, ⁴mykim0808@ewha.ac.kr

Abstract

Modern society has seen an increase of opportunities to enter facilities due to the rise of diseases in aging population and the decrease of family members. This research is a quasi-experiment study conducted to verify the effects on facility elders' blood cortisol and serotonin level by applying aroma oil hand massage and regular oil hand massage to them, in order to help improve their stress and depression. Aroma hand massage and regular oil hand massage were applied on the elders' both hands for 10 minutes per session, 5 times week, for a total of 2 weeks. The study carried out the massage after receiving an approval from the Bioethics Committee of K University for the ethical considerations of study participants based on Helsinki Declaration. The subjects were informed that they could always be withdrawn at any time they want and that the confidentiality of study details would be guaranteed. Data was analyzed using paired ttest and independent t-test, and the research results demonstrated that both aroma hand massage group and regular oil hand massage group did not have a significant decrease in the cortisol level before and after the experiment. In contrast, the serotonin level decreased significantly (p=.016) in the aroma oil hand massage group and thus depression increased significantly, but the serotonin level decreased (p=.066) in the regular oil hand massage group, causing the elders' depression to increase. It is considered that a comparative study of aroma hand massage and regular oil hand massage on depression must be performed in the future.

Keywords: aroma therapy, massage, cortisol, serotonin, elderly

1. Introduction

According to the '2015 Statistics on the Aged' in Korea, 1 out of 5 households is an elderly household and the elderly households take up 7.4% of the total households in Korea. Also, the report predicted that the people aged 65 or over occupy 13.1% of the entire population and will increase to 40% by 2060 [1]. This implies that a measure toward elders' health problems that are increasing proportionally according to aging population is needed more than ever. Moreover, refusal to marriage and childbirth as well as poor overall economy in modern society have led to the decrease of family members, which has made the efforts to take care of elders as a general social issue. Such changes in the age class and family members have become one of the reasons that causes elders exposed to health problems to enter healthcare facilities. Elders can especially be discouraged by the changes of surrounding environment due to their weaker economic capabilities, negative changes of health conditions, and declining social functions, which

can appear as negative stress and the problems of physical symptoms. In other words, any stress that they can cope with by themselves can bring energy to their life, but the stress they cannot bear can harm their health, and this is a more important problem for elders whose range of self-care and self-management continuously narrow. In addition, depression is influenced not only by physical health but also psychological and environmental factors.

The Ministry of Health and Welfare (2013) reported the severity of elders' depression in the analysis of health insurance expenditures for 5 years (2007~2011), as the depression of elders aged 80 or above grew by 7.8%, a huge difference from the increase of entire average by 2.2% [2]. The ministry suggested a treatment method accordingly. Meanwhile, females at 70s had the highest percentage, followed by 60s and 80s in age comparison [2]. This report indicates that females are more vulnerable and weaker than males to respond to psychological changes. Although not everyone is exposed to depression with aging, having no ability to handle the limitations of self-management in terms of physical and psychological aspects can lead to health problems. However, receiving outside help can be helpful to one's positive self-management if it is not for an individual's temperamental cause. Aging process and health or environmental changes can especially make a residential space become a shared space for many people from a space that guarantees an individual's private life. Such change requires efforts for elders to build relationships with others and can become a psychological burden, along with the stress on environmental changes.

Aroma therapy and massage are one of the widely used methods of nursing intervention as shown in previous studies [3]. Aroma essential oil is applied through various paths such as absorption and touching without any special tools [4] and can bring positive results without side effects [5]. Also, hand massage is a non-invasive method that can help psychological relaxation [6]. The research considered the minimum physical stimulation, psychological stability, and economic status of elders to use this method as an intervention to alleviate their stress and depression caused by the changes of surrounding environment due to their health problems. To check the effects of synergy blending, the research used hand massage that applies a few aroma essential oil types and jojoba oil hand massage that anyone can apply easily and economically tested their effects on stress and depression, and depression, and aims to be used as a basic material of nursing intervention. The purpose of this research is to apply aroma hand massage and regular oil hand massage on facility elders and investigate the effects on cortisol, a stress level indicator, and serotonin, a depression level indicator.

2. Methods

2.1. Research Design

This research is a quasi-experiment study comparing the aroma hand massage group that applied hand massage and the group that applied jojoba oil hand massage based on Nonequivalent Control Group Non-Synchronized Design.

2.2. Research Subjects and Ethical Considerations

The experiment was carried out on elders living in B sanatorium located in K city of Korea. It selected 40 subjects who agreed to participate in the study but excluded those who did not meet the selection criteria. Research was performed by selecting 32 subjects randomly to have 16 elders for aroma hand massage group and another 16 for control group. The subjects were selected from different residing floors because of the concern of balm spreading and the possibility of experiment effects contaminated in the control group. To be more specific, the subjects who were selected understood the study purpose, agreed to participate in the study, had no allergic reaction to aroma scent, did not take

anti-depressant or sleep inducer, and had no problems with auditory and olfactory functions.

This research was carried out after the screening and approval of K University's Bioethics Committee (IRB No 2011-3) and based on Helsinki Declaration. The study participation consent wrote that the participation in this study is voluntary, study subjects can withdraw from it at any time if they no longer wish to continue it, and that the confidentiality of this study is guaranteed. For the ethical consideration, study subjects received the explanation on the purpose and method of study, read and signed the consent, and agreed to participate in it.

2.3. Research Tools

2.3.1. Cortisol: Venous blood was collected during 10am-12pm, a consistent timeslot, and was submitted to G Company for analysis. High blood cortisol level indicates high stress level.

2.3.2. Serotonin: Venous blood was collected during 10am-12pm, a consistent timeslot, and was submitted to G Company for analysis. High blood serotonin level indicates low depression level.

2.4. Research Procedure

Data was collected from September 2011 to November 2011, and the study was performed in the order of research assistant training, prior investigation, intervention, and post investigation as follows.

2.4.1. Training of Research Assistant

The researcher completed an aroma massage specialist course. To give correct hand massage to elders, the research assistant watched a video on aroma hand massage, received two hours of hand massage education and training from an aroma massage specialist, and conducted hand massage on students and elders more than twice with the researcher to participate in the study.

2.4.2. Prior Investigation

Data was collected after explaining the study purpose and method to facility head and research participants in B Sanatorium and after asking for their agreement. The elders' general characteristics were measured and their cortisol and serotonin were collected by a trained nurse in the sanatorium between 10am-12pm.

2.4. 3. Experiment

The aroma group and regular oil group were given massage for 10 minutes per session a day, 5 times a week. The aroma group was given massage at 6pm-8pm every day with oil that was diluted with 5 lavender, 4 mandarin, and 1 marjoram, and with 2% of sweet almond oil. The regular oil group was massaged with jojoba oil at 6pm-8pm every day.

2.4.4 Post Investigation

Blood was collected from both aroma group and regular oil group at 10am-12pm in the morning as in the prior investigation. Thank-you gifts were given to all subjects after the post investigation ended.

2.5. Data Analysis

The collected data was analyzed using SPSS 19.0 program. Both group's general characteristics and homogeneity test were measured by errors, percentage, and x^2 –test, and the homogeneity test on both group's dependent variables for the prior investigation

was performed by independent t-test. The difference within the group was carried out by paired t-test and the difference between the groups was analyzed by independent t-test.

3. Results

3.1. Subjects' General Characteristics and Homogeneity Test

The study subjects' general characteristics showed that there were 17 (53.1%) elders who were 80-85 years old out of 32, the highest in number, and there were more females (26 elders, 99.3%) than males (6 elders, 18.8%) in terms of gender. In the difference of general characteristics between aroma hand massage group and regular oil hand massage group, there was no statistically significant difference between the two group's gender (p=.654) and age (p=.445) <Table 1>.

Table 1. Homogeneity Test according to the Subjects' General Characteristics

					(N=32)	
Variables	Categories	Aroma group (n=16)	Regular oil group (n=16)x2		р	
		N(%)	N(%)			
gender	Male	4(25)	2(12.5)	02	654	
	Female	12(75)	14(87.5)	.02	.034	
Age	65-79	3(18.8)	4(25.0)	17.14	.446	

Aroma group: Aroma hand massage group

Regular oil group: Jojobar oil hand massage group

3.2. Homogeneity Test on the Subjects' Prior Cortisol and Serotonin Level

The prior cortisol level of two groups appeared to be homogeneous and have no significant difference between the two groups, as the aroma hand massage group had the average of 9.106 ± 2.0789 and the regular oil hand massage group had the average of 11.306 ± 2.6726 . The prior serotonin level of two groups appeared to be homogeneous and has no significant difference (p>.05) between the two groups, as the aroma hand massage group had the average of 119.844 ± 72.71 and the regular oil hand massage group had the average of $111.281\pm67.1270 < \text{Table } 2>$.

Table 2. Homogeneity Test on Cortisol and Serotonin

						(N=32)	
Variable	Aroma group (n=16)		Regular oil group (n=16)		Б	D	
	М	SD	М	SD	1	1	
Cortisol	9.11	2.08	11.31	2.67	1.789	.191	
Serotonin	119.84	72.71	111.28	67.13	1.235	.275	

Aroma group: Aroma hand massage group Regular oil group: Jojoba oil hand massage group

3.3. Cortisol Difference Test between Both Groups

In both group's cortisol level, the aroma hand massage group decreased from the average of $9.11(\pm 2.08)$ before the intervention to the average of $8.92(\pm 2.26)$ after the intervention (p = .717), and the regular oil hand massage group decreased from the

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average of $11.31(\pm 2.67)$ before the intervention to the average of $9.83(\pm 2.16)$ after the intervention (p = .124). However, there was no statistically significant difference in the comparison of cortisol level between the two groups (p = .252) <Table 3>.

Group	Before the intervention Average (standard deviation)	After the intervention Average (standard deviation)	t ₁	P ₁	Difference before and after the intervention Average (standard deviation)	t ₂	P ₂
Aroma group	9.11(±2.08)	8.92(±2.26)	369	.717	188(±2.03)	-1.167	.252
Regular oil group	11.31 (±2.67)	9.83(±2.16)	-1.628	.124	-1.48(±3.623))		

Table 3. Comparison of Cortisol between Both Groups (N=32)

Aroma group: Aroma hand massage group

Regular oil group: Jojoba oil hand massage group t_{1} paired t-test

 $t_{2=}$ independent t-test

3.4. Serotonin Difference Test between Both Groups

In both group's serotonin level, the aroma hand massage group decreased from the average of $119.84(\pm 72.71)$ before intervention to the average of $78.15(\pm 56.10)$ after the intervention (p = .016), and the regular oil hand massage group decreased from the average of $111.28 (\pm 67.13)$ before the intervention to the average of $88.53(\pm 70.58)$ after the intervention (p = .066). However, there was no statistically significant difference in the comparison of serotonin level between the two groups (p=. 648) <Table 4>.

Table 4. Comparison of Serotonin between Both Groups (N=32)

Group	Before the intervention	After the intervention	t ₁	P ₁	Difference before and after the intervention	t ₂	P ₂
	Average (standard deviation)	Average (standard deviation)			Average (standard deviation)		
Aroma group	119.84(±72.71)	78.15(±56.10)	-2.717	.016	41.69(±61.39)	461	.648
Regular oil group	111.28(±67.13)	88.53(±70.58)	-1.981	.066	-22.75(±45.94)		

Aroma group: Aroma hand massage group Regular oil group: Jojoba oil hand massage group $t_{1=}$ paired t-test

 $t_{2=}$ independent t-test

4. Discussion

This research is a quasi-experiment study that tested the effects of aroma hand massage and regular oil hand massage on facility elders' stress and depression.

As stress can show physical symptoms and has an ambivalent tendency of bringing both positive and negative influences on the changes of individual health conditions, stress management is an important part in nursing intervention. Among facility elders, while the group that had aroma hand massage saw a decrease of cortisol level from the average of 9.11 before the experiment to the average of 8.92 after the experiment according to the research result, there was no significant decrease of cortisol level within the group.

Even though there was some methodological difference with this research, this is consistent with findings that there was no significant decrease in cortisol from the aroma inhalation study conducted by Nursing Students Grade 4 subjects [7]. While in different method study, this was different from the following results: Stress decrease significantly as a result from the measurement of the aroma inhalation studies in the general population [8], stress decrease after applying aroma massage to hospital patients for 5 minutes, 10 times a week for a total of 2 weeks, though it had a methodological difference from this research [9]; a result showing a significant decrease of stress after elders received a weekly education and absorption in a local senior center and absorbed 2 lavender oil, 1 bergamot oil, and 2.5 lavender hydrosol at home for 4 weeks [10].

Although the cortisol level in the regular oil hand massage group decreased from the average of 11.31 before the experiment to the average of 9.83 after the experiment, there was no significant decrease of cortisol level within the group, which demonstrated that there was no significant difference in the stress level within the regular oil hand massage group. Although research methods are not identical, this study is different from the results that the stress level was significantly decreased immediately after massage to the cancer patients [11]. Such results are due to the limitations for comparison due to the lack of experimental studies that measured stress with physiological variables, and stress can be caused by various factors besides environmental variables. Moreover, it is considered that this study is different from other studies that analyze the results after the experiment by survey questionnaire, as elders who entered senior healthcare facilities are not physically healthy, and that there are limits to the changes of cortisol level that is to have physiological changes. In addition, this research showed that there was no significant effect to reduce stress because the cortisol level between the aroma hand massage group and regular oil hand massage group had no significant difference.

Depression is an important health problem that must be considered as nursing intervention because it can occur continuously to elders and bring both physical and psychological symptoms. According to the study results, the serotonin level of facility elder group that had aroma hand massage decreased from the average of 119.84 before the experiment to the average of 78.15 after the experiment. This indicates that the serotonin level rather decreased significantly within the group and thus depression increased significantly. Such result had limits for comparison because there were no enough studies that had the same research methodology. On the other hand, the serotonin level of regular oil hand massage group decreased from the average of 111.28 before the experiment to the average of 88.53 after the experiment, but it was not a significant decrease. In other words, the depression of this group did not rise significantly because its serotonin level did not decrease significantly after the experiment. However, there was no significant difference of the serotonin level between the aroma hand massage group and regular oil hand massage group. Since there was no significant difference of serotonin level between the aroma hand massage group and regular oil hand massage group, there was no significant decrease in depression. This research appeared to be different from the result of previous study [12], which demonstrated that the survey-questionnaire depression of aroma hand massage group decreased more significantly than the group that did not.

5. Conclusion

This research is a quasi-experiment study that tested the effects of aroma hand massage and regular oil hand massage on facility elders' stress and depression.

According to the research results, the cortisol level of both aroma hand massage group and regular oil hand massage group had no significant decrease before and after the experiment. Also, there was no significant difference in the decrease of cortisol level between the aroma hand massage group and regular oil hand massage group. While the serotonin level of aroma hand massage group decreased significantly after the experiment, the serotonin level of regular oil hand massage group had a moderate decrease after the experiment. However, there was no significant difference of serotonin decrease level between the aroma hand massage group and regular oil hand massage group.

The research demonstrated that there was no difference in the decrease of both the aroma oil hand massage and regular oil hand massage's cortisol level, the stress indicator for facility elders. However, serotonin level, the facility elders' depression indicator, decreased significantly in the aroma hand massage group and caused the group's depression to increase significantly, and the serotonin level fell in the regular oil hand massage group. In serotonin comparison, there was no significant decrease of serotonin between the aroma hand massage group and regular oil hand massage group.

There are limits to generalize this research as it was carried out to one sanatorium, and thus the researchers suggest a repetitive study that confirms the difference of aroma hand massage and regular oil hand massage. It is considered that an additional study is needed to identify the most efficient nursing intervention along with the classification of subjects based on their health conditions.

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Authors

Hyun Suk Kim, she is an assistant professor, Department of Nursing of science, Kunsan College of Nursing, Gunsan 573-719, Chonbuk, Republic of Korea

Research Areas: Complementary and Alternative, Women's Health, Nursing Education, Qualitative Research



Suk Hee Kim, she is the director of a Bongjung Elderly Homes, Kunsan College of Nursing, Gunsan 573-719, Chonbuk , Republic of Korea



Yeon Suk Park, she is an RN, PhD, Professor of Nursing Department, Kongju 314-701, Chungnam, Republic of Korea



Miyoung Kim, she is an RN, PhD, MBA, Associate Professor, Division of Nursing Science, College of Health Sciences, Ewha Womans University, Seoul 03760, Republic of Korea