A Study on Change in Physiological Activity in Elderly after Performance of Beauty Therapy Program

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Abstract

The Purpose of this study was to provide academic fundamental data so that the beauty therapy program is usefully used as a leisure activity for the elderly, by investigating the effect of a beauty therapy program on the physiological changes of 65-75 years old elderly. The results showed that eight session of beauty program activates the parasympathetic nerves of the elderly and significantly increases their salivary pH level. This proves that the beauty program is a beneficial activity that has a positive effect on the physiological activation of the elderly and improves their quality of life and that beauty therapy has a value enough to be used as a leisure activity program for the elderly.

Keywords: Elderly, Beauty Program, Physiological, Leisure activity Program

1. INTRODUCTION

As of 2021, the elderly population over 65 in Korea accounted for 16.8% of the total population, and the aging index increased by 10.5 from the previous year (Statistics Korea, 2022). The increase in the elderly population means that the proportion of elderly in the individual life cycle is increasing, leading naturally to increasing interest in 'how to spend the extended old age'(song, 2017). Productive leisure activity in old age is essential for achieving a happy old age and contributes to improved quality of life (McGuire, Boyd & Tedrick, 2009). According to the 'Korean Time use Survey' published by the Statistical Korea in 2020, the leisure time of those over 60 is longer than that of any other age groups, reaching 6h. and 21m. a day, but the media usage rate of watching live broadcasts is also the highest in this age group. This means that they spend their leisure time mainly in passive activities such as watching TV. Therefore, policies and various related programs and environments should be developed and established to encourage activities that make their leisure time to be productive and happy, not activities just to spend time (Park, 2019).

Aging comes to everyone, and social, biological, and in the process, psychological changes are experienced. Conditions such as cessation of economic activity, loss of social status, and deterioration of health and change in appearance due to physiological aging may decrease the self-esteem of the elderly and increase their depression (Choi, 2013). Therefore activities that improve the physiological function and mediate negative emotions of the elderly may have a strong correlation with successful old age.

Recently, in senior activities facilities such as senior citizens' centers, welfare centers, and lifelong learning centers, leisure activities and lifelong learning programs for the elderly with themes such as beauty, music, art, exercise, and gardening have been administered. Among them, the beauty program, through beauty activities, improves the physiological function and alleviates negative psychology of the elderly. Won (2010) also defined a beauty program as 'a scientific and artistic activity that makes our appearance beautiful, an act that makes human beings in the happiest state possible'. In addition, several previous studies showed that the beauty program had a positive effect on the cognitive function and psychological characteristics of the elderly. Despite these significant research results, the utility of the beauty program is significantly lower than that of other programs. This is because there are few popular beauty programs for the elderly who can voluntarily participate in leisure activities. This study, accordingly, developed a program applying a beauty therapy that the elderly can easily follow and use at home. The purpose of this study was provided academic basic data that enables the beauty program to be usefully used as a leisure activity for the elderly by scientifically verifying the effect of the program on the physiological changes of the participating elderly.

2. THEORETICAL BACKGROUND

2. 1. Physiological Characteristics of Elderly

According to the 'CUPID' theory by Arking (1991), aging is a Cumulative, Universal, Progressive, Intrinsic, and Deleterious. His theory defines structural and functional changes in our body from maturity to death, suggesting that disease and aging are different.

In old age, changes in appearance such as hair whitening, loss of skin elasticity, and deep wrinkles occur, and changes in body functions such as impaired blood circulation, decrease in subcutaneous fat and muscle mass, and loss of hearing and vision are also observed (Im, 2011). In addition, the performance of delicate tasks is difficult, and behavior is slowed down due to impairment of sensory function, neurological response and endocrine system dysfunction (Cho & Park, 2001).

The physiological aging of the elderly causes cardiovascular diseases, and a major channel of which is weakening of control over the autonomic nervous system (Yoon & Baek, 2011). The autonomic nervous system, which consists of the sympathetic and parasympathetic nerves, maintains the homeostasis of the body through interaction, but an imbalance may cause disease (Chae, 2015). In general, activation of the sympathetic nerve reduces blood flow to internal organs, and increases blood sugar, blood pressure, sweat, and blood flow to muscles (Kim, Woo & Chae, 2005). In contrast, parasympathetic activation reduces blood pressure and heart rate, increases intestinal motility and salivation, and leads to sleepiness (Min, 2006). The desirable ratio of activation of parasympathetic and sympathetic nerves during physical activity is 4:6 where sympathetic activity is slightly higher (Chae, 2015). The activation of sympathetic nerves due to continuous stress causes negative effects on the body such as cardiovascular disease and decreased immune function (Kang, 2020). Unfortunately, as aging progresses, the activation rate of parasympathetic nerves slows down in our body, and the activation of sympathetic nerves increases (Jeong., at al. 2006). That is, an increase in the activation of sympathetic nerves due to aging increases the risk of cardiovascular diseases, and conversely, activation of parasympathetic nerves prevents cardiovascular diseases.

The amount of saliva secretion is regulated according to the activity of the sympathetic and parasympathetic nerves and is known to decrease due to stress on the body (Seo, 2012). Khalaila, Cohen and Zidan (2014) reports that elevated stress and depression autonomic nervous system and saliva are index that predicts health status because they reflect the physiological characteristics of the elderly.

2. 2. Beauty Therapy Program

The extension of life expectancy and the improvement of living standards have made the elderly have diverse needs, and thus the scope of topics for lifelong education and leisure programs for them has also been expanded. Recently, as the awareness of successful aging (Garfein & Herzog, 1995) has been increased, a program that respects the individual sensibilities and emotions of the elderly in pursuit of happiness, love, and satisfaction in old age is required.

In the U.K in 1975, a combination therapy of psychological counseling and beauty services was performed to help psychological recover of patients with facial burns and to compensate for their facial damage. This was motivated the foundation of beauty therapy, and the empirical study on makeup psychology conducted at Oxford University (1978) formed the theoretical basis of beauty therapy. In Japan since 2000, studies on beauty therapy have been actively conducted in fields such as psychology, cosmetology, and nursing through beauty programs that mainly use makeup (Ham, 2017). The domestic studies on beauty programs consisted of programs based on various materials such as skin care, nail care, hair care, fashion, and makeup and the beauty program was defined as 'a method of giving sense of happiness to the physical, psychological, and social areas of the subject' (Kang, 2005). Also, in terms of efficacy, previous studies reported that the beauty program was mainly effective in psychological and physiological aspects of subjects. Table 1 shows detailed content of domestic studies on beauty program, similar to the material of this study.

Table 1. Domestic Previous Studies on Beauty Therapy Program

resecarcher	Target	Contents	Confirmed effect
B. K Kim (2008)	Woman elderly	Hair care Hand care Makeup Foot care	Self-respect life satisfaction Depression
Y. R Kim (2101)	Woman college students	Image making Makeup Nail care Face care Hair care	Stress Self-esteem interpersonal relationship
H. R Lee & M. J Kang (2010)	Woman elderly	Nail care Hair care	Norepinephrine Cortisol epinephrine
J. M Im (2011)	Woman elderly	Fashion Nail care Makeup Hair care Face care	Social health Self-esteem life Mental health
J. H Ji (2012)	Woman elderly	Hair care Nail care Makeup	Mood scale Congnitive function
J. H Moon(2014)	Woman elderly	Ear massage Shoulder massage Hair cate Nail care Makeup Aroma therapy Face-painting Hand massage	Emotional Balance Scale Depression Self-esteem Life satisfaction
K. H Kil (2015)	Nurse	Face care Makeup Hair care	Self-efficacy Stress Self-esteem
H. K Ham(2017)	Woman elderly	Hair care Face care Makeup Nail care Hand massage	Psychological characteristics Cogintive functions
K. S Park(2018)	Schizophrenic	Personal color Makeup Face care Nail care Hair styling	Depression Self-esteem

3. METHOD.

3. 1. Structure of Program

The contents of the beauty program administered in this study were composed through the analysis of nine previous studies presented in Table 1. Among previous studies, Kim (2008), Lim (2011), Moon (2014), and Ham (2017), into which elderly women participate, administered program using skin care, hand massage, foot massage, nail care, hair care, makeup, and fashion. Among previous studies, Kim (2008), Lim (2011),

Moon (2014), and Ham (2017), whose subjects are woman elderly, administered the program through skin care, hand massage, foot massage, nail care hair care makeup, and fashion. The results showed that the program had a positive effect on cognitive function and psychological characteristics. In addition, Lee (2010) and Ji (2012) reported psychological changes in elderly women with dementia who performed a beauty program consisting of makeup, hair care, and nail care, and Kim (2010) reported that beauty programs had positive effect on the psychological changes in woman college students. As such, previous studies applied a program consisting of various beauty therapy. Although these studies had some differences in methodology such as selection of types of beauty therapy, they had a common purpose of verifying the effects of beauty activities on physiological and psychological aspects. Specifically, most of the subjects were women, and 8 out of 9 studies reported results on psychological characteristics. Noting that their subjects were mainly women and they focused on the effects of psychological aspects, the author designed a program that allows the participation of men and that utilizes indicators on the effects of beauty therapy and physiological aspects. Specifically, most of the subjects were women, and 8 out 9 studies reported results on psychological characteristics. Noting that their subjects were mainly women and they focused on the effects of psychological aspects, the author designed a program that allows the participation of men and that utilizes indicators on the effects of beauty therapy and physiological aspects. Accordingly, a program was composed of self-manipulative therapy that, regardless of sex, can be used sufficiently by one person due to the ease of learning and the simplicity of application. Manipulative therapy is known to, through the act of massage, have a positive effect on physiological and psychological stability by harmonizing the autonomic nervous system, relaxing muscle tension, promoting blood circulation, and reducing stress and depression (Heo, 2015). The beauty program of this study, therefore, consisted of self-hand massage, foot massage, and face care. The reason these massages were adopted is that self-massage on hand and foot is not limited by place and time, is economical and has few side effects, and face care was shown, in the analysis of previous studies, to have highest satisfaction and is the practiced most often even after the program ends (Lim, 2011 & Kim 2010).

The final version of the program in this study consisted of repeat of basic movements so that it is learned and remembered easily. The program was improved through four pilot tests in 15 elderly people over 65 years of age. In addition, to secure the validity and reliability of the program, it was reviewed by three experts with more than 20 years of experience and obtained a Ph. D in cosmetics. The number and time of the beauty program were determined to be eight times and 120 minutes per session, once a week. In addition, in consideration of the previous studies and the opinions of the subjects, a session was divided two prats with 50 minutes by a break time of 20 minutes. Table 2 shows details of beauty program administered in this study.

Table 2. Detail Curriculum of Beauty Program.

Week	Round	Curriculum	Training Contents	Activities
1	1round	Self-Hand massage	Hand Stretching Hand massage with oil	Learn hand massage sequence physical activity with hand
	2 round	Self-- Face care	Cleansing Deep cleansing Lifting massage Collagen pack	Remember the order in which cosmetics are used. Detailed physical activity using hands
2	1round	Self-Foot massage	Stretching before foot massage Relaxation massage Stimulating reflector	Learning the foot massage course Massage way cognitive behavior
	2 round	Self- Face care	Cleansing Deep cleansing Stone massage Mask sheet	Experience using new massage tool
3	1round	Self-Hand massage	Stretching before hand massage Hand massage with oil	Detailed physical activity using hands

	2 round	Self-Face care	Cleansing Deep cleansing Lifting massage Whitening mask Applying basic cosmetics	Memorize cosmetic use order Detailed physical activity using hands
4	1round	Self-Foot massage	Stretching before foot massage (with Golf ball) Relaxation massage Stimulating reflector	Active physical activity by hands Learning new massage methods using golf balls
	2 round	Self-Face care	Cleansing Deep cleansing Stone massage Hydro mask Applying basic cosmetics	Detailed physical activity using hands Review of massage method using stone
5	1round	Self-Hand massage	Stretching before hand massage Hand massage with oil	Remember the order of hand massage
	2 round	Self-Face care	Cleansing Deep cleansing Lifting & Stone massage Collagen pack Applying basic cosmetics	Active physical activity by hands Combining two massages
6	1round	Self-Foot massage	Stretching before foot massage Relaxation massage Stimulating reflector	Enhancing health through stimulation of foot reflector
	2 round	Self-Face care	Cleansing Deep cleansing Lifting & Stone massage Mask sheet Applying basic cosmetics	Cognitive behavior caused by massage method review
7	1round	Self-Hand massage	Stretching before hand massage Hand massage with oil	Have a caring mind for yourself
	2 round	Self-Face care	Cleansing Deep cleansing Lifting & Stone massage Whitening mask Applying basic cosmetics	Increasing confidence with self-skincare Delicate hand movements
8	1round	Self-Foot massage	Stretching before foot massage (with Golf ball)	Have a caring mind for yourself Enhancing health

		Relaxation massage Stimulating reflector	through stimulation of foot reflector
2 round	Self-Face care	Cleansing Deep cleansing Lifting & Stone massage Hydro mask Applying basic cosmetics	Cognitive behavior caused by massage method review Increasing confidence with self-skincare

3. 2. Subjects

This single-arm pre-post was approved by the Institutional Bioethics Committee of Daejeon University (IRB: Institutional Review Board: 1040647-201906-HR-010-02). Referring Kang (2015), the number of samples was calculated to be 34 by G*Power program with an effect size of 0.5, significance level of 0.05, and power of 0.95, and considering the dropout rate of 30%, it was finally determined to be 50.

The criteria for selection of subjects were i) 65-75 years old: ii) no experience of participating in a beauty program or using a special beauty shop in the last six months: iii) voluntary participation and submission of signed consent: and iv) ability to understand and follow this study normally. The exclusion criteria were i) allergies to oils or cosmetics: ii) diagnosis of cognitive function problem by MMSE-DS test: and iii) in the process of treating serious disease.

3. 3. Instrument

3. 3. 1 Measurement Tool for Autonomic Nervous System

In this study, autonomic activity was measured using uBioMacpa (BioSense Creative Co., Ltd, Korea). uBioMacpa is a reliable measuring device that has obtained medical device item approval (13-262), medical device manufacturing system certification (No. 3447), and product paten (No. 10-0954817). When subjects insert their index finger into the measuring instrument, the light coming through the finger is illuminated by an illuminated sensor and an LED light source to project light into the peripheral arterioles. The amount of absorbed or reflected light is converted into a signal and analyzed, and the sympathetic nerve, parasympathetic activity, vascular elasticity, and cumulative stress are displayed along with the average value of the same age group (Jeon, 2017). The measurement takes about 2 minutes and 30 seconds, and during which, movements or conversations that may affect the machine were to be avoided, and they were asked to fast for two hours before the measurement and not to consume caffeinated beverages on the day of the measurement.

3. 3. 2 Saliva pH Paper

The salvia pH of the subjects was measured using BTB test paper (Toyo Roshi Kaisha, Ltd. Japan) measuring pH 6.2-7.8 at intervals of 0.2 and BCP test paper (Toyo Roshi Kaisha, Ltd. Japan) measuring pH 5.6-7.2.

Place a test paper on the subjects' tongue, and after the paper absorbs the saliva, determine the most similar color from the standard color palette. Higher body acidity leads to lower saliva pH. In this study, in order to exclude the subjective judgment of the researcher, two assistants, contacted with the help of the study institution, measured and recorded data. The consumption of the foods may affect salivary pH, such as caffeinated beverages, was banned two hours prior to measurement.

3. 4. Data Analysis

The data collected in this study were analyzed using the SPSS version 21.0 program, and Repeated Measures ANOVA (RM ANOVA) was performed to verify the changes in autonomic activity and salivary pH over time.

4. RESULTS

4. 1. Sympathetic Activity (LF: Low frequency)

The LF change by the beauty program was measured using repeated measures ANOVA (Table 3).

Table 3. Change in LF activity.

Period	Mean	SD	Post-verification
pre-LF	5.15	.862	
1 week LF	5.56	.921	
2 week LF	5.55	1.215	
3 week LF	5.40	.998	
4 week LF	5.52	.789	n/a
5 week LF	5.38	.821	
6 week LF	5.26	.824	
7 week LF	5.40	.864	
8 week LF	5.41	.937	

Table 4 is an identity matrix table to determine whether there is a difference in LF change according to the execution time of the beauty program. Mauchly's W value 1 indicates a perfect sphericity identity matrix, and the further away from 1, the weaker the sphericity. However, since the significance value is 0.023, which does not satisfy the sphericity assumption, the Greenhouse-Geisser value among the modified test statistic, Epsilon values, was used for testing. The difference in change over time was not statistically significant ($F=1.495$, $p<.179$).

Table 4. Muchly's Spherical verification.

Within Subjects Effect	Mauchly' W	Apporx Chi-Square	df	p	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	lower-bound
Time	.279	53.752	35	.023	.759	.890	.125

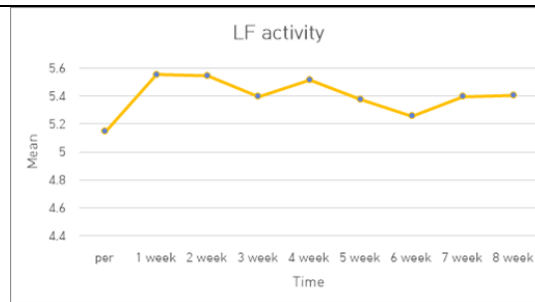| Source		Type III Sum of Squares	df	Mean Square	F	p
Time	Sphericity assunption	6.665	8	.833	1.495	.157
	Greenhouse-Geisser	6.665	6.070	1.098	1.495	.179
	Huynh-Feldt	6.665	7.121	.936	1.495	.167
	Lower-bound	6.665	1.000	6.665	1.495	.228
Error (Time)	Sphericity assunption	200.622	360	.557		
	Greenhouse-Geisser	200.622	273.139	.735		
	Huynh-Feldt	200.622	320.429	.626		
	Lower-bound	200.622	45.000	4.458		

p<.05

Fig 1. Change in LF activity.

4. 2. Parasympathetic activity (HF: High Frequency)

The HF change by the beauty program was measured using repeated measures ANOVA (Table 5).

Table 5. Change in HF activity.

period	Mean	SD	post-verification
pre-LF	5.00	.735	
1 week LF	5.39	.921	
2 week LF	5.32	.854	
3 week LF	5.23	.911	
4 week LF	5.36	.636	E, f, g, h, i>a
5 week LF	5.43	.573	i>d
6 week LF	5.43	.669	
7 week LF	5.43	.658	
8 week LF	5.62	.669	

Table 6 is identity matrix test table to determine whether is a difference in LF change according to the execution time of the beauty program. Since the sphericity assumption was not satisfied in Mauchly's sphericity test, the Greenhouse- Geisser value among Epsilon values was used. There was statistically significant difference (F=3.996, p<.000).

Table 6. Mauchly's Spherical verification.

Within Suvjects Effect	Mauchly' W	Apporx Chi-Square	df	p	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	lower-Bound
Time	.167	75.377	35	.000	.708	.821	.125

| source		Type III Sum of Squares	df	Mean Square	F	p
Time	Sphericity assunption	10.602	8	1.325	3.996	.000
	Greenhouse-Geisser	10.602	5.660	1.873	3.996	.001
	Huynh-Feldt	10.602	6.567	1.614	3.996	.000
	Lower-bound	10.602	1.000	10.602	3.996	.052
Error (Time)	Sphericity assunption	119.378	360	.332		
	Greenhouse-Geisser	119.378	254.702	.469		
	Huynh-Feldt	119.378	295.534	.404		
	Lower-bound	119.378	45.000	2.653		

p<.05
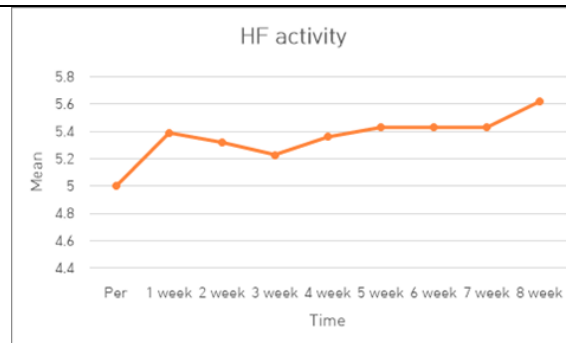
Fig 2. Change in HF activity

4. 3. Saliva pH

The saliva pH change by the beauty program was measured using repeated measures ANOVA (Table 7).

Table 7. Change in Saliva pH

period	Mean	SD	post-verification
pre-LF	6.69	.446	
1 week LF	7.02	.325	
2 week LF	6.97	.368	
3 week LF	7.01	.366	
4 week LF	7.02	.343	b, c, d, e f, g, h, i > a
5 week LF	7.02	.273	
6 week LF	7.03	.358	
7 week LF	7.04	.315	
8 week LF	7.07	.268	

Tagle 8 is an identity matrix test table to determine whether there is a difference in Saliva pH change according to the execution time of the beauty program. Since the sphericity assumption was not satisfied in Mauchly's sphericity test, the Greenhouse- Geisser value among Epsilon values was used. There was statistically significant difference (F=12.323, p<.001).

Table 8. Maucnly's Spherical verification

Within Suvjects Effect	Mauchly' W	Apporx Chi-Square	df	p	Epsilon		
					Greenhouse-Geisser	Huynh-Feldt	lower-Bound
Time	.140	82.715	35	.000	.710	.825	.125

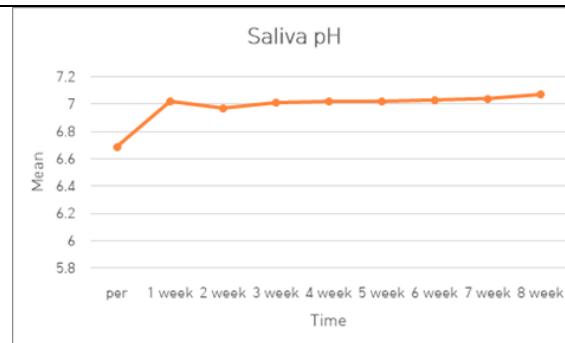| source		Type III Sum of Squares	df	Mean Square	F	p
Time	Sphericity assunption	4.672	8	.833	12.328	.000
	Greenhouse-Geisser	4.672	5.683	1.098	12.328	.000
	Huynh-Feldt	4.672	6.598	.936	12.328	.000
	Lower-bound	4.672	1.000	6.665	12.328	.001
Error (Time)	Sphericity assunption	17.053	360	.557		
	Greenhouse-Geisser	17.053	255,745	.067		
	Huynh-Feldt	17.053	296.928	.057		
	Lower-bound	17.053	45.000	.379		

p<.05

Fig 3. Change in Saliva pH.

5. DISCUSSION & CONCLUSION

It was found that the leisure activity program for the elderly not only provide hobbies and entertainment, but also promote self-confidence and attachment to life and have a positive effect on mental health (song, 2019). Recently, various programs such as music therapy, recall therapy, exercise therapy, and horticultural therapy have been used to stimulate interest and activity needs of the elderly (Ham, 2017). The development of various programs to help elderly spend their extended old age meaningfully is one of the important challenges in modern society.

The purpose of this study was to test the effect of beauty-mediated program on the physiological characteristics of the elderly. Autonomic nerve activity and salivary pH were used as indicators for testing physiological characteristics.

After the program was performed, the sympathetic activity in autonomic nerve activity of elderly increased within the normal range, and the difference was not statistically significant. On the other hand, parasympathetic activity increased statistically significantly.

The autonomic nervous system, which controls the heart, maintains homeostasis of physiological functions through an appropriate response to stress applied to the body (Lee & Chung, 2006). Among the autonomic nervous systems, parasympathetic function rapidly declines with aging (Choi & Roh, 2004), meaning that a decrease in parasympathetic activity is significantly associated with a decrease in heart rate variability due to aging. Therefore, the increase in parasympathetic activity observed in this study seems to delay 'physiological aging' effectively. In addition, the results of this study show a similar tendency to the significance of parasympathetic activity reported by Yoon (2011) that had female elderly to perform self-foot massage, although there are difference in method between them, supporting the theory that manual therapy harmonizes the autonomic nerves.

The second indicator, the salivary pH level, increased statistically significantly. Saliva pH decreases with increasing acidity, and acidification means an increase in bacteria (Jeong & Cho, 2017). In addition, Sandin (1985) reported that salivary acidity significantly decreased in stressful situations and argued that salvia acidity was also related to anxiety levels, and Morse (1983) reported that relaxation of the body through meditation significantly increased salivary pH. In particular, they revealed that salivary pH level is a physiological mechanism that can explain stress, supporting Read (1989)'s argument that stress-related sympathetic nerves change with activation of salivary pH level. In this context, the significant increase of pH level observed in this study means that performance of beauty program reduced physiological stress in the elderly, supporting the conclusion that parasympathetic nerves were significantly activated.

These results show that the beauty program performed in this study is a desirable activity that has a positive effect on the physiological aspects of the elderly. The beauty program is a beneficial action to prevent physiological aging by reducing the stress reduction of the elderly and maintaining the balance of their autonomic nervous system, and furthermore, it is an activity that improves the quality of life of the elderly. Therefore, the development of customized programs for the elderly using various beauty therapies is strongly recommended.

6. ACKNOWLEDGEMENTS

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