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Effects of full body meridian massage using *Rubus coreanus Miquel* and *Hovenia dulcis thunb* extract

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Abstract : The purpose of this study was to verify the effect of dietary treatment of Hovenia dulcis thunb extract and Rubus coreanus Miquel extract combined with full-body nerve massage on fatigue recovery. The results are as follows. Homogeneity between groups was secured due to the general characteristics of the study subjects, and the abdominal group showed a significant decrease in fatigue and pain changes after full nerve massage. Changes in fatigue substances in the blood showed a significant decrease in the Hovenia dulcis thunb extract group, and changes in blood levels before and after the stress hormone experiment showed a significant decrease in cordicol in the Hovenia dulcis thunb extract group. Through the results of this study, we were able to confirm that oxidative stress was reduced in adult women in their 20s to 50s through a full-body nerve massage after eating Rubus coreanus Miquel extract and Hovenia dulcis thunb extract, using an objective and systematic experimental method for changes in oxidative stress.

Keywords : Rubus coreanus Miquel, Hovenia dulcis thunb, Body merdian massage, Oxidative stress, Antioxidant enzyme

1. Introduction

In Korea, it is known that antioxidant, anti-inflammatory, and anti-aging effects are achieved through substances extracted from herbal medicine and natural foods based on traditional medicine, including folk and oriental medicine, and massage is one of the many ways to relieve fatigue. It is effective in eliminating pain, recovering from fatigue, promoting metabolism by promoting circulation of capillaries, and psychological stability by providing stimulation from outside the body. Fatigue can be relieved more quickly by combining rest and massage rather than just resting. Many studies have reported that recovery is possible[1].

Massages include foot massage, meridian massage, aroma massage, sports massage, and lymphatic massage. [2] said that meridian massage, which is widely used in skin care clinics, is a water technique of Western medicine

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based on the meridians and acupoints of Oriental medicine. It incorporates the concept of massage, and is said to be effective in improving health and beauty through acupressure or massage rather than using acupuncture or moxibustion.

Meridians are passages that move energy and blood throughout the body and regulate each part, and acupuncture points are small holes distributed according to a certain principle along the meridians [3]. In a study on the theoretical background of oriental medicine beauty meridians related to skin care. the effect of meridians is to relax stiff muscles, naturally fix skeletal abnormalities, and promote the activation of energy and blood circulation, thereby beautifying skin. It was reported that it delays aging. In addition[4], stated that meridians are not in the same form as the internal organs of the human body, but are a type of energy flow that protects the living body. They are invisible lines that connect acupuncture points distributed on the face and maintain a constant biological response system for Qi and blood circulation. It is said to be a scientific beauty method that restores human natural beauty and relieves fatigue by improving the circulation of energy by massaging the meridians that flow in correlation with the skin[5].

Meridian massage is the most commonly used among various massages. It improves the circulation of blood and lymph, facilitates the supply of oxygen and nutrients, removes stagnant waste, relieves stiff tension, and helps connect with other people. It is known to be effective in reducing stress by providing mental stability through skin contact [6]. In addition, for more effective stress reduction, research using a specific diet before massage continues, including [7, 8, 9], and the bioactive substances used are antioxidant ingredients using natural substances.

Meridian massage is a massage technique based on the theory of meridians[10]. It uses body parts to give the body's energy and energy to acupuncture points to regulate the autonomic nervous system and smooth internal function, as well as skin care and anti-aging. It is a manual therapy that prevents and increases the body's natural healing power[11, 12]. From a physiological perspective, meridian massage is effective in controlling blood pressure, obesity control, blood lipid control, constipation control, and pathological control. On a physical aspect, it has the effect of improving muscle strength and muscular endurance, improving daily living performance, and controlling joint range of motion, and has psychological effects. It is known to be effective in relieving stress, relieving tension, and suppressing anger [13]. Academic research on meridian massage includes beauty-related studies such as study on weight management and study on the effect on the face of women in their 50s, as well as studies on patients with hemiplegia study on patients with essential hypertension, starting with studies on its use in the medical field, stress relief and increased metabolism by promoting blood flow[14], reduction of fatigue substances [15] immunity enhancement[16].

Hovenia dulcis Thunberg extract began to be commercialized as it was reported to have antibacterial, antioxidant, anti-diabetic, fatigue recovery, and hangover relief effects through alcohol decomposition. The phenolic components of Hovenia dulcis Thunberg extract include ferulic acid and catechin. and benzoic acid have been reported.

Rubus coreanus Miquel extract is known for its anti-aging, arteriosclerosis, anti-cancer, thrombosis prevention, and vision effects. As the pharmacological effects of Rubus coreanus Miquel are known, research is being conducted on its functional ingredients and physiological effects. The main components of Bokbunja extract have been reported to include citric acid such as pectin, glucose, and fructose, carbohydrates, organic acids such as malic acid and salicylic acid, and nutritional components such as vitamins B and C, phosphorus, iron,

and potassium.

Although many such studies have proven the effects of meridian massage and dietary therapy using natural extracts on antioxidant and fatigue recovery, there is insufficient research on the effect of meridian massage and extract dietary therapy on recovery from oxidative fatigue. Therefore, the purpose of this study was to verify the effect of dietary treatment of Hovenia tree fruit extract and Bokbunja extract combined with full-body nerve massage on fatigue recovery.

2. Research method

2.1. Research subjects and methods

This study was conducted at E Clinic in Seoul for 3 days from March 30, 2015, and the study subjects were 8 people in the control group (C), 8 people in the bokbunja extract diet group (A), and 8 people in the Hovenia tree fruit extract diet group (B). A total of 24 people (8) fasted for 12 hours beforehand, collected blood before and after, and analyzed changes in blood components such as lactic acid, hormones, and antioxidant enzymes. Adult women in their 20s to 50s who had never experienced full nerve massage were selected. According to a study by Yeo Hye-yeon (2014), people who regularly receive meridian massage tend to feel less tired, so in this study, subjects were selected based on people who do not receive meridian massage regularly.

2.2. Experimental methods and procedures

2.2.1. Experiment material

The diet of this study was conducted after conducting a preliminary experiment. Two people were formed into two groups and each received 150 mL of bokbunja extract and bottled water, and Hovenia chinensis fruit extract and bottled water in the ratio of 1:5, 2:4, 4:2, and 6:1, respectively. By diluting at a ratio of 0, the concentration thought to reduce fatigue after a sauna for 2 hours after eating was first selected. The concentration that was felt to cause the least fatigue 30 minutes after eating at the next selected concentration and after full-body nerve massage was selected and applied to this experiment. Accordingly, in this experiment, for C, 150 mL of bottled water was diluted, for A, 25 mL of 100% stock solution of Bokbunja from company C was diluted in 125 mL of bottled water, and for B, 150 mL of 100% stock solution of Hovenia fruit from company G was fed.

2.2.2. Full body nerve massage

Full nerve massage therapy was performed by applying basic movements such as acupressure, sweeping, circular drawing, rubbing, pinching, bouncing, and breathing (Ok In-hee, 2008). The experimental environment was maintained at a constant temperature and humidity of 22~26℃ and 50~60% humidity. Full nerve massage was performed once based on a study by Virginia et al. (2006), and included preparation and relaxation (15 minutes), head, cervical and back care (30 minutes), lower body care (30 minutes), and abdominal care (15 minutes), chest, neck and arm care (15 minutes), and finishing (15 minutes), for a total of 120 minutes. The therapists were made up of experts with more than 5 years of practical experience after obtaining a national technical qualification for cosmetology (skin), and were trained and prepared twice in advance to ensure consistency in the order and technique of the full-body nerve massage applied in this study.

2.2.3. Research Ethics Committee approval

This study was approved by the Institutional Review Board (IRB) of Konkuk University, and the project number was 7001355-201502-HR-047, and was carried out from recruitment of research subjects to analysis of results according to the procedures and

contents of the research plan.

2.2.4. Body fluid analysis method

The analysis of body fluids was requested to Clinic M, which conducted the experiment, and the analysis method was to refrigerate the collected samples and collect them during the requested period for analysis. CON (electrical conductivity), rH2 (electron activity, energy generation power), and pH (hydrogen ion index) were analyzed using electrical conductivity measurement using MEDICAM-05X (Naegyeong Cheonlian, Korea) equipment using urine and saliva. , ST&SG (surface tension) was analyzed using urine and a test strip using a surface tension meter (Korea Calcam Pharmaceuticals, Korea), Brix (sugar content test), P/U (protein utilization), Vit C was analyzed using urine test strips.

The study subjects were instructed not to have taken any drugs within 3 months, to abstain from alcohol 2 weeks prior to the experiment, and to go to bed while maintaining an empty stomach 12 hours prior to the experiment. All experiments were conducted in the morning, when the influence of physical activity and lifestyle habits was minimal. After arriving at the laboratory and resting, the study subjects were instructed to receive 45 mL of urine and 4 mL of saliva in the specimen containers distributed directly to them before eating and after performing a full-body nerve massage.

2.3. Data analysis

The data collected in this study were analyzed using SPSS Win 21.0, one-way analysis of variance (ANOVA) was performed to verify the homogeneity of the study subjects, and the x2 test was performed to identify general characteristics. Additionally, a paired t-test was performed to analyze changes in fatigue and pain, fatigue substances, stress hormones, and antioxidant enzymes in the blood before and after the experiment.

3. Results and Discussion

3.1. General characteristics of study subjects

In this study, age, BMI, and sleep level were investigated as general characteristics of the study subjects, and as a result of verifying homogeneity between dictionary C, A, and B, there was no significant difference between groups as shown in Table 1, and homogeneity between groups was secured.

3.2. Changes in fatigue and pain after full nerve massage

3.2.1. Fatigue after full body nerve massage

Table 2 shows the subjects' daily fatigue before the experiment using the visual analog scale (VAS-F), and there was no significant difference between groups, ensuring homogeneity ($p>.05$).

Table 3 shows the changes in fatigue after full-body nerve massage in the subjects of this study. C showed a significant decrease from 79.37 (M) beforehand to 48.12 (M) after ($p<.001$), and A showed a significant decrease from 84.37 (M) beforehand to 43.75 (M) after ($p<.001$). .001), B showed a significant decrease from 82.25 (M) beforehand to 39.87 (M) afterward ($p<.001$).

3.2.2. Pain after full nerve massage

The daily pain of the subjects of this study before the experiment is shown in Table 4, and there was no significant difference between the groups, ensuring homogeneity ($p>.05$).

Table 5 shows the changes in pain after total nerve massage in the subjects of this study. C showed a significant increase from 1.54 (M) beforehand to 3.32 (M) after ($p<.01$), and A showed a significant increase from 1.25 (M) beforehand to 2.65 (M) after ($p<.01$). .001), B showed a significant increase from 1.47 (M) beforehand to 2.37 (M) afterward ($p<.001$).

Table 1. General chracteristics of those surveyed

Variable			Cont. (n=8)	A (n=8)	B (n=8)	Total
Sex	Male	Frequency	3	3	2	8
		% of group	37.5	37.5	25.0	33.3
	Female	Frequency	5	5	6	16
		% of group	62.5	62.5	75.0	66.7
				x^2=.375, p=.829		
Age	20`s	Frequency	4	1	4	9
		% of group	50.0	12.5	50.0	37.5
	30`s	Frequency	4	7	3	14
		% of group	50.0	87.5	37.5	58.3
	40`s	Frequency	0	0	1	1
		% of group	0.0	0.0	12.5	4.2
				x^2=5.857, p=.210		
BMI	Underweight	Frequency	2	1	2	5
		% of group	25.0	12.5	25.0	20.8
	Normalweight	Frequency	4	3	3	10
		% of group	50.0	37.5	37.5	41.7
	Ocerweight	Frequency	2	2	3	7
		% of group	25.0	25.0	37.5	29.2
	Obese	Frequency	0	2	0	2
		% of group	0.0	25.0	0.0	8.3
				x^2=4.886, p=.559		
Drinking level	I don't do it	Frequency	2	2	1	5
		% of group	25.0	25.0	12.5	20.8
	I do it sometimes	Frequency	2	0	2	4
		% of group	25.0	0.0	25.0	16.7
	Once a week	Frequency	2	2	2	6
		% of group	25.0	25.0	25.0	25.0
	2 times a week	Frequency	2	3	3	8
		% of group	25.0	37.5	37.5	33.3
	4 or more days a week	Frequency	0	1	0	1
		% of group	0.0	12.5	0.0	4.2
				x^2=4.650, p=.794		
Average sleep time	< 4	Frequency	1	2	0	3
		% of group	12.5	25.0	0.0	12.5
	4 – 7	Frequency	4	4	5	13
		% of group	50.0	50.0	62.5	54.2
	7 – 9	Frequency	3	2	2	7
		% of group	37.5	25.0	25.0	29.2
	≥ 9	Frequency	0	0	1	1
		% of group	0.0	0.0	12.5	4.2
				x^2=4.440, p=.617		
Total		Frequency	8	8	8	24
		% of group	33.3	33.3	33.3	100.0

Abbreviations: Cont., control;, A, *Rubus coreanus Miquel*;, B, *Hovenia dulcis Thunberg*

Table 2. Homogeneity verification

Variable	Groups		MS	F	p
Daily fatigue	Cont.	79.37±6.23	50.375	.947	.404
	A	84.37±7.76	53.202		
	B	82.25±7.77			

Abbreviations were the same as Table 1.

Table 3. Visual analog scale changes

Variable	Group	Measurement (Mean±SD)		Analysis of variance	
		Baseline	After massage	t_1-t_2 (M±SD)	t (p)
VAS-F	Cont.	79.37±6.23	48.12±3.72	31.25±6.40	13.792 (.000***)
	A	84.37±7.76	43.75±5.82	40.62±6.23	18.438 (.000***)
	B	82.25±7.77	39.87±9.61	42.37±8.60	13.934 (.000***)

***p<.001
Abbreviations were the same as Table 1.

Table 4. Homogeneity verification

Variable	Groups		MS	F	p
Everyday pain	Cont.	1.54±0.30	.191	2.484	.108
	A	1.25±0.21	.077		
	B	1.47±0.29			

Abbreviations were the same as Table 1.

Table 5. Pain changes after full nerve massage

Variable	Group	Measurement (Mean±SD)		Analysis of variance	
		Baseline	After massage	t_1-t_2 (M±SD)	t (p)
Everyday pain	Cont.	1.54±0.30	3.32±0.74	−1.77±0.94	−5.297 (.001**)
	A	1.25±0.21	2.65±0.25	−1.40±0.37	−10.675 (.000***)
	B	1.47±0.29	2.37±0.16	−0.90±0.30	−8.339 (.000***)

**p<.01, ***p<.001
Abbreviations were the same as Table 1.

Table 6. Homogeneity verification

Variable	Cont. (n=8) M±SD	A (n=8) M±SD	B (n=8) M±SD	F	p
Lactic acid (mg/dL)	11.36±3.77	14.82±6.51	14.70±5.52	1.062	.364
Uric acid (mg/dL)	5.47±1.48	5.26±1.11	4.58±1.00	1.158	.333
Cortisol (㎍/dL)	11.00±7.04	13.67±6.77	15.50±6.24	.913	.417
BAP (㎛ol/L)	1874.62±76.59	1858.00±157.33	1920.62±228.37	.305	.740
d-ROMs (CARR.U)	281.50±22.91	324.00±51.91	306.37±30.00	2.655	.094
Lipase (U/L)	31.50±10.39	37.75±9.40	37.25±12.18	.839	.446
Glucose (mg/dL)	88.87±4.70	91.12±10.45	83.00±10.84	1.696	.208
T.Chol (mg/dL)	172.50±31.14	180.75±26.61	182.12±30.06	.252	.780
Triglyceride (mg/dL)	95.00±74.98	92.87±37.92	88.00±47.63	.033	.967
LDH (U/L)	281.87±49.10	271.37±39.27	257.75±42.40	.611	.552
HDL (mg/dL)	57.50±16.52	57.75±9.99	65.25±21.75	.550	.585
LDL (mg/dL)	109.50±29.22	107.25±26.55	106.12±26.81	.031	.969

Abbreviations were the same as Table 1.

3.3. Changes in blood composition

3.3.1. Verification of homogeneity of research subjects

The fatigue substances, stress hormones, antioxidant enzymes, and lipids in the blood of the subjects of this study before the experiment are as shown in Table 6, and there was no significant difference between groups in all items, ensuring homogeneity ($p>.05$).

3.3.2. Changes in blood fatigue substances

Table 7 shows the changes in fatigue substances in the blood of the subjects of this study before and after the experiment. In the case of lactic acid, C showed a 5.98% decrease from 11.36 (M) beforehand to 10.67 (M) after, and A showed a significant decrease from 14.82 (M) beforehand to 10.00 (M) after ($p<.05$). B showed a significant decrease from 14.70 (M) beforehand to 10.50 (M) afterward ($p<.01$).

In the case of uric acid, C showed a significant decrease from 5.47 (M) beforehand to 4.97 (M) after ($p<.05$), A showed a decrease from 5.26 (M) beforehand to 4.95 (M) after, and B showed a decrease from 4.58 (M) beforehand to 4.31 (M) afterward.

3.3. Changes in stress hormones

Table 8 shows the changes in blood stress hormones of the subjects of this study before and after the experiment. In the case of cortisol, C showed a decrease from 11.00 (M) beforehand to 9.10 (M) after, A showed a significant decrease from 13.67 (M) beforehand to 8.16 (M) afterward ($p<.01$), and B showed a significant decrease from 15.50 (M) beforehand to 9.78 (M) afterward ($p<.01$).

3.4. Changes in antioxidant enzymes

Table 9 shows the changes in antioxidant enzymes in the subjects of this study before and after the experiment. In the case of BAP, C showed a significant increase from 1874.62 (M) before to 2091.12(M) after ($p<.05$), and A showed a significant increase from 1858.00 (M) before to 2236.37(M) after. ($p<.001$), B showed a significant increase from 1920.62(M) beforehand to 2363.75(M) afterward ($p<.01$).

Table 7. Changes in blood fatigue substances

Variable	Group	Measurement (Mean±SD)		Analysis of variance	
		Baseline	After massage	t_1-t_2 (M±SD)	t (p)
Lactic acid (mg/dL)	Cont.	11.36±3.77	10.67±4.22	0.68±2.89	.671 (.524)
	A	14.82±6.51	10.00±4.35	4.82±4.29	3.180 (.015*)
	B	14.70±5.52	10.50±5.08	4.20±2.48	4.786 (.002**)
Uric acid (mg/dL)	Cont.	5.47±1.48	4.97±1.72	0.50±0.42	3.307 (.013*)
	A	5.26±1.11	4.95±1.35	0.31±0.46	1.904 (.099)
	B	4.58±1.00	4.31±0.45	0.27±0.60	1.277 (.242)

*p<.05, **p<.01, ***p<.001
Abbreviations were the same as Table 1.

Table 8. Changes in stress hormones

Variable	Group	Measurement (Mean±SD)		Analysis of variance	
		Baseline	After massage	t_1-t_2 (M±SD)	t (p)
Cortisol (μg/dL)	Cont.	11.00±7.04	9.10±6.02	1.90±3.32	1.617 (.150)
	A	13.67±6.77	8.16±5.96	5.51±3.17	4.911 (.002**)
	B	15.50±6.24	9.78±6.46	5.71±3.22	5.012 (.002**)

**p<.01
Abbreviations were the same as Table 1.

Table 9. Changes in antioxidant enzymes

Variable	Group	Measurement (Mean±SD)		Analysis of variance	
		Baseline	After massage	t_1-t_2 (M±SD)	t (p)
BAP (μmol/L)	Cont.	1874.62± 76.59	2091.12±212.18	−216.50±235.77	−2.597 (.036*)
	A	1858.00±157.33	2236.37±165.79	−378.37±106.45	−10.053 (.000***)
	B	1920.62±228.37	2363.75±187.06	−443.12±341.81	−3.667 (.008**)
d-ROMs (CARR.U)	Cont.	281.50±22.91	278.75±23.59	2.75±2.60	2.986 (.020*)
	A	324.00±51.91	292.00±41.53	32.00±26.30	3.441 (.011*)
	B	306.37±30.00	273.75±17.45	32.62±19.56	4.716 (.002**)

*p<.05, **p<.01, ***p<.001
Abbreviations were the same as Table 1.

In the case of d-ROMs, C showed a significant decrease from 281.50 (M) beforehand to 278.75 (M) afterward ($p<.05$), and A showed a significant decrease from 324.00 (M) beforehand to 292.00 (M) afterward. ($p<.05$), and B showed a significant decrease from 306.37 (M) beforehand to 273.75 (M) afterward ($p<.01$).

4. Conclusion

The purpose of this study was to verify the effect of dietary treatment of Hovenia dulcis thunb and Rubus coreanus Miquel extract combined with full-body nerve massage on fatigue recovery. The results are as follows.

1. As a result of examining the general characteristics of the study subjects such as age, BMI, and sleep level, and verifying the homogeneity between C, A, and B in advance, there was no significant difference between the groups, confirming the homogeneity between the groups.

2. The daily fatigue level of the subjects of this study before the experiment using the visual analog scale (VAS-F) showed no significant difference between the groups, ensuring homogeneity, and the change in fatigue level after the full-body nerve massage was C from 79.37 (M) before the experiment. There was a significant decrease to 48.12 (M) ($p<.001$), A showed a significant decrease from 84.37 (M) beforehand to 43.75 (M) after ($p<.001$), and B showed a significant decrease from 82.25 (M) before ($p<.001$). M) showed a significant decrease from post-mortem to 39.87(M).

3. The change in pain after full nerve massage showed a significant increase in C from 1.54 (M) beforehand to 3.32 (M) afterward ($p<.01$), and in A from 1.25 (M) beforehand to 2.65 (M) afterward. There was a significant increase ($p<.001$), and B showed a significant increase from 1.47 (M) beforehand to 2.37 (M) afterward.

4. In the case of lactic acid changes in fatigue substances in the blood before and after the experiment, C showed a 5.98% decrease from 11.36 (M) before the test to 10.67 (M) after the experiment, and A showed a significant decrease from 14.82 (M) before the test to 10.00 (M) after the test. ($p<.05$), B showed a significant decrease from 14.70 (M) beforehand to 10.50 (M) afterward. In the case of uric acid, C showed a significant decrease from 5.47 (M) beforehand to 4.97 (M) after death ($p<.05$), A showed a decrease from 5.26 (M) beforehand to 4.95 (M) after death, and B showed a decrease from 4.58 (M) beforehand to 4.31 (M) afterward.

5. In the case of cortisol, C showed a decrease from 11.00 (M) before and 9.10 (M) after the stress hormone experiment, and A showed a significant decrease from 13.67 (M) before and 8.16 (M) after the test. ($p<.01$), and B showed a significant decrease from 15.50 (M) beforehand to 9.78 (M) afterward.

6. In the case of BAP before and after the antioxidant enzyme experiment, C showed a significant increase from 1874.62 (M) before to 2091.12 (M) after ($p<.05$), and A showed a significant increase from 1858.00 (M) before to 2236.37 (M) after. showed a significant increase ($p<.001$), and B showed a significant increase from 1920.62 (M) beforehand to 2363.75 (M) after ($p<.01$). In the case of d-ROMs, C showed a significant decrease from 281.50 (M) beforehand to 278.75 (M) afterward ($p<.05$), and A showed a significant decrease from 324.00 (M) beforehand to 292.00 (M) afterward. ($p<.05$), and B showed a significant decrease from 306.37 (M) beforehand to 273.75 (M) afterward ($p<.01$).

Through the results of this study, we were able to confirm that oxidative stress was reduced in adult women in their 20s to 50s through a full-body nerve massage after eating Hovenia dulcis thunb and Rubus coreanus Miquel extract, using an objective and systematic experimental method for changes in oxidative stress. In other words, full-body

nerve rack massage is effective in reducing oxidative stress, and taking Hovenia dulcis thunb and Rubus coreanus Miquel extract before full-body nerve rack massage forms an antioxidant defense system and protects the body's metabolism from the effects of free radicals, making it more positive for reducing oxidative stress. It can be seen that it is effective. This study conducted a one-time diet to verify the effect of reducing oxidative stress using an ECS diagnostic tool, but we expect follow-up studies using a combination of repetitive diet and various therapies in the future.

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