Effect of Acupressure Massage on Temperatures of Acupoints, Severity of Facial Paralysis, Subjective Symptoms, and Depression in Bell's Palsy Patients

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Purpose: Bell's palsy is a nerve paralysis disease that causes functional impairments and affects psychological and aesthetical parts. This study aimed to examine whether acupressure massage had positive effects on facial paralysis, subjective symptoms, and depression in Bell's palsy patients. **Methods:** This study was conducted by a nonequivalent control group pretest-posttest design. Participants were 60 patients with Bell's palsy. 30 patients were assigned to the experimental group and the remaining 30 patients were assigned to the control group. The period of the study was from October 1, 2008 to July 30, 2009. Acupressure massage was offered to the experimental group for 20 minutes per day for two weeks (a total of six times). A SPSS/Win 12.0 program was used for data analysis. **Results:** A difference in Digital Infrared Thermographic Imaging (DITI) between affected and unaffected sides was less in the experimental group having acupressure massage than in the control group and the score of the recovery of facial paralysis was also increased in the experimental group. The Facial Nerve Grade Systems by Brackmann score that is a more objective index showed a significant difference between two groups (F = 26.81, $p < .001$). Subjective symptom and depression scores were more decreased in the acupressure massage group than in the control group. **Conclusion:** Based on the results, it is considered that acupressure massage can be applied to Bell's palsy patients as an alternative therapy. It can be used as an evidence-based East-West nursing intervention to improve patients' physical and mental functions.

Key Words: Bell's palsy, Facial Paralysis, Symptoms, Depression

INTRODUCTION

Bell's palsy is a form of temporary facial paralysis resulting from a damage or dysfunction of the cranial nerve VII (the facial nerve). As a result, person becomes unable to control facial muscles on the affected side. It is also called 'facial nerve palsy' or 'peripheral facial palsy' [1]. When no specific cause can be identified, the condition is called 'idiopathic Bell's palsy' or just 'Bell's palsy'. Bell's palsy occurs about 20 per 100,000 persons worldwide a year [2]. The number of patients who are hospitalized for facial paralysis as a main sick has been increasing every year (4,597 patients in 2010, 5,135 in 2011, and 5,634 in 2012) [3].

The first look on the face gives impression about the person. The person's character, mental state, health state, and more [4] are shown on the facial look. Bell's palsy may cause excessive stress during personal relations because of the obvious manifestation of the face. The obviousness causes depression in many cases. Given the societal interest on aesthetics, the importance of early recovery from the Bell's palsy increases [5].

Although Bell's palsy has a high cure rate, it is not always complete.

When recovery is incomplete, it causes patient anxiety and pain and has a bad influence on the person's social relationship. In particular, if the facial nerve is regenerated abnormally, its aftereffect continues for a long time, resulting in much greater suffering than facial nerve palsy itself [6]. Symptoms of Bell's palsy may include dysarthria, inability to close the eyelid, decreased tearing, difficulty chewing, drooling, spilling food, mastoid process pain, migraine, and facial numbness. Since these problems are closely related to basic physiological activities, patients have many difficulties in meeting their basic needs. Thus, complete recovery of facial nerve palsy and prevention against its aftereffect is very important in treatment and care of Bell's palsy patients [1].

Acupressure massage is a complementary method that combines meridian and collateral, a traditional Korean medicine concept, with massage. Acupressure massage is more than just a general massage that eases muscle and connective tissues. In acupressure massage, acupoints (or acupuncture points) are stimulated by finger pressure and/or rubbing so that the meridian and collateral can control blood circulation of the whole body and physiological functions of five viscera and six vowels and can promote natural treatment effect on pathologic changes, in a more effective way [7]. It can be applied to treatment of diseases in a variety of ways. It has long history in traditional nursing intervention and will continue to serve as a nursing intervention for long [8].

Especially acupressure massage had a relaxation effect and is very good to improve facial paralysis. It was reported that acupressure massage contributed to decreased depression and improved sleeping quality [9].

The positive effects of massage were examined in various intervention researches since 1990s [10]. In Korea, partial effects were reported using acupressure massage of the face [11, 12]. Ko [13] argued that massage was the most effective treatment in facial skin exercises. The acupressure massage of facial acupoints may promote the recovery of facial paralysis in facial nerve palsy patients and give psychological stability. It has also no side effects [14]. Moreover it is non-invasive and less painful compared to acupuncture therapy and easy to apply without special equipment by clinical nurses.

According to the most basic and important theory of Digital Infrared Thermographic Imaging (DITI), normal adults' thermographic pattern is always symmetrical [15]. The America Medical Association (AMA) also considers an asymmetrical pattern of bilateral thermography distribution as the most important element in reading DITI [16]. In normal physiology, body temperature is maintained by feedback mechanism through the cerebral center for temperature control of hypothalamus and closely associated with bilateral body. Thus, themography appears symmetrical and temperature difference in the left and right of normal body is within 0.3˚C on average [17].

Skin temperature is controlled by an autonomic nerve action. In a pathological state, the distribution of body temperature causes the change of several manifestation modes. Thus, when certain parts get sick, the metabolic rate and thermal conduction become high or low, resulting in difference in skin temperature [18]. Pressing acupoints located on the body surface by fingers in Bell's palsy patients is effective to prevent and heal diseases by circulating blood and endocrine secretion and making a nervous system active [13].

There are few researches applying acupressure massage to Bell's palsy patients and investigating its effects, especially on the changes in infrared thermography, facial paralysis status, subjective symptoms, and depression. Detection of thermal changes by DITI is easy, non-invasive and objective. This is the first attempt to objectively verify the effects of acupressure massage through thermal changes in the nursing society.

The purpose of the study was to verify the effects of acupressure massage on the recovery of Bell's palsy. To be specific, the effect of the acupressure massage applied to acupoints that are related to recovery of facial paralysis through DITI, facial paralysis status, subjective symptoms, and depression in idiopathic Bell's palsy patients. The results may contribute to evidence based nursing practice.

METHODS

1. Study design

This was a quasi-experimental study using a nonequivalent control group, non-synchronized design.

2. Study subjects

The subjects of the study were idiopathic Bell's palsy patients hospitalized and treated in D University Oriental Hospital located in G Metropolitan City from October 1, 2008 to July 30, 2009 and met selection criteria. The selection criteria are as follows;

1) Diagnosed as idiopathic Bell's palsy within 5 days from onset; Research shows that the facial paralysis worsens rapidly within 24~48 hours and becomes worst within 5 days [18].

2) Have no injuries or infectious diseases in the face; only idiopathic

Bell's palsy were included.

3) Have no other known diseases at entry;

4) Can verbally communicate and complete a questionnaire; and

5) Provide consent to participate in the study.

The qualified subjects were identified with help of an Oriental medical ophthalmology &. otolaryngology & dermatological surgery doctor. Patients with a thermal difference in face acupoints of ≥ 0.3°C from DITI were selected. The subjects selected were given explanation about the purpose of the study and asked to complete an informed consent. Patient were asked to refrain from using intradermal needles or Western medicines so that the effects of exogenous variables could be controlled as much as possible. For ethical matters, the control group subjects were given an ample opportunity to learn about acupoints and acupressure massage along with an acupoint picture so that they could do acupressure massage at home after discharge.

Necessary sample size to attain study objectives was estimated using Cohen [19] power analysis based on the results of Lee and Kim [8] and Kim and Jung [12]. The number of subjects needed for a one-sided test was 26 per group at the significance level of 5%, the effect size of 0.7, and the power of 80% but 30 subjects per group were recruited in this study. Non-synchronized allocation was used because of not enough number of Bell's palsy patients to allocate into two groups at the same time and preventing the diffusion of experiment. The experimental subjects were selected after the pre-test and post-test were completed for the control group to prevent an error.

3. Ethical consideration

The study was approved by D Oriental Medicine center review board (IRB: DSGOH-005).

4. Definition of the terminology

1) Acupoint and acupressure massage

Acupoints which are body surface reflex points of meridian and collateral in traditional Korean medicine [13]. Massage is a hand technique of Western medicine. Acupressure massage is an combination of oriental and western medicine. In this study, facial acupoints that are relevant to Bell's palsy were pressed by hand to make the circulation of meridian smooth, which relaxes and stimulates muscle.

2) Digital infrared thermologic imaging

DITI is a method to objectify the physiologic state of the musculoskel-

etal system and pain. It digitalizes body's micro thermal changes using a computer, and expresses by various color [20]. DITI (IRIS-5000, Medicore. Korea) [21] was used in this study. A test room was isolated from the light and heat from outside to maintain low humidity (50%) with a constant temperature (21-23°C) and keep the air current still. The subjects were asked to refrain from acupuncture, physical therapy, drinking, or smoking within 4 hours before the test was performed. It was confirmed that they had no external stimuli such as massage, sensitive exercise, or medication. Before the test, they had time to adapt themselves to test environment for 15 minutes for psychological stabilization. For the experimental measurements were tested after massage DITI post 4 hours.

DITI temperature measurement was parts where risorius and buccinator muscles were located were selected. For correct measurement of muscle parts and minimized error, average temperature was measured by circling the line from the angle of mouth to submental region in the direction of muscle movement. Acupoint temperature difference was measured between unaffected and affected sides. According to the theory of Kim et al. [15] ≥ 0.3°C was significant and < 0.3°C was normal. Assessment was made whether the affected side was 0.3°C higher or lower than the unaffected side.

Thermal measurement was made in such acupoints as Chanjuk (BL2), Sabaek (ST2), Georyo (ST3), Yeonghyang (LI20), Jichang (ST4), and Hyeopgeo (ST6) of the affected and unaffected sides located on the face. The smaller the difference between the two sides, the more improvement in facial paralysis. As the temperature of the affected side could become higher or lower than that of the unaffected side [15], a thermal difference between the two sides was used as an absolute value.

3) Recovery of facial paralysis status

The recovery of facial paralysis status refers to the degree of improved facial nerve palsy, such as normal recovery of facial muscle, recovery of conduction disorder, a prevention against degeneration, and facial nerve regeneration [21]. Two measurement tools are used in this study.

(1) The House-Brackmann Grading System (H-B Grading System) was first developed by House and Brackmann [22] and modified and complemented by Kim et al. [23]. H-B Grading System grades facial appearances, symmetry and strain during repose, and forehead, eyes, and mouth status during exercise. The System uses a 6-point scale: normal (1), mild paralysis (2), moderate paralysis (3), moderate-severe paralysis

(4), severe paralysis (5), and profound paralysis (6). The lower the score, the better.

The H-B grading system is widely used by medical professionals to evaluate facial nerve function. But the system is criticized for its subjective nature. The evaluation of the intentional movement of the facial muscle depends totally on how the scoring physician 'feels'. However, decent overall reliability and ease of use has made this scale popular among medical professionals.

(2) The Facial Nerve Grade Systems (FNGS) refers to the score measured by an objective indicator presented by House and Brackmann [22] to complement the subjective aspects of the H-B Grading System. For eyebrow movements, vertical movement was measured in centimeter (cm) scale. 1cm was divided into four 0.25cm, thus converting the movement into a 4 point scale. Same procedure was followed for the lips, except that horizontal movement was measured. The sum is then converted into a 6 point scale from normal to profound paralysis, as presented by House and Brackmann [22]. The System uses a 8 points summing eyes and mouth were converted in a 6-point scale: G1 (1): normal movement, G2 (2): Slight asymmetry of facial movement compared with the unaffected, G3 (3): Decreased facial movement, closed eyes, and some forehead movement compared with the unaffected side, G4 (4): Synkinesis and mass action without forehead movement, G5 (5): Slight movement without forehead movement and profound paralysis (6). The lower the score, the better [23].

4) Subjective symptoms

Subjective symptoms refer to symptoms felt by patients themselves [24]. The facial nerve palsy scale was developed by Lee et al. [25], modified and complemented by Jung and Kang [11], and further complemented by the researchers after consulting with specialist in Oriental medical ophthalmology &. otolaryngology & dermatological surgery. An item 'difficulty in breathing through the affected nose' which is frequently observed among the patients was added to the original nine items.

The instrument consisted of then items (post-auricular pain, lacrimal hypersecretion, dry eye, stiff painful nape, headache, facial pain, loss of taste, hyperacusis, language disorder, and difficulty in breathing through the affected nose). Each item was measured in a 4-point scale, ranging from 'not at all (1)' to 'always (4)'. The higher the score, the severer the subjective symptoms. Cronbach's α reliability coefficients for Jung and Kang [11]'s study using nine items was .81 and that for this study was .85.

5) Depression

Depression is an emotional state of anxiety, melancholy, failure, helplessness, and worthlessness that causes a pathologic state [26]. In this study, depression was measured by Self-Rating Depression Scale (SDS) developed by Zung, Richards and Short [26]. The scale consisted of 20 emotional, psychological, and physical items, each with a 4 point scale. 10 reverse items were reversely scored, ranging from 20 to 80. The higher the score, the severer the depression. In this study, the depression cutoff values are no depression (< 50), mild depression (50-59), and moderate to severe depression (> = 60) by Zung, Richards and Short study [26]. Cronbach's α reliability coefficients for Zung, Richards and Short study [26] was .73 and that for this study was .83.

5. Data collection

A pilot study was conducted to verify the feasibility of the study and grasp problems. Acupressure massage was given and DITI, the recovery of facial paralysis, subjective symptoms, and depression were measured in 3 idiopathic Bell's palsy patients who were hospitalized in D Oriental Medicine center from September 10 to 30, 2008. The order of massage and experimental hours were adjusted based on the results of the pilot study.

All participants received a method to feel acupoints by hands for two hours from an Oriental doctor for elaborate experimental treatment. After they fully trained the technique, two people gave acupressure massage to one person, so that they could have a view of the same feeling, skill, and strength and remove a measurement error.

The experimental treatment of this study consisted of four steps: warm-up massage, relaxation massage, reflex zone massage, and cool-down massage.

During the warm-up massage, the face was gently pressed using both hands after a warm, wet towel was placed on the face. Generous portion of jojoba oil was applied during the relaxation massage and the face was gently massaged with fingers so that the oil was well saturated. The reflex zone massage was the main body of the massage course.

Eight acupoints related to facial paralysis such as Jichang (ST4), Hyeopgeo (ST6), Yangbaek (GB14), Sabaek (ST2), Chanjuk (BL2), Yeonghyang (LI20), Georyo (ST3), and Sajukgong (TE23) [15] and twelve acupoints related to facial meridian massage including Joksamni (ST36) and Hapgok (LI4) to dispel wind and remove obstruction of collaterals and Pungji (GB20) and Yepung (TE17), remote acupoints, were stimu-
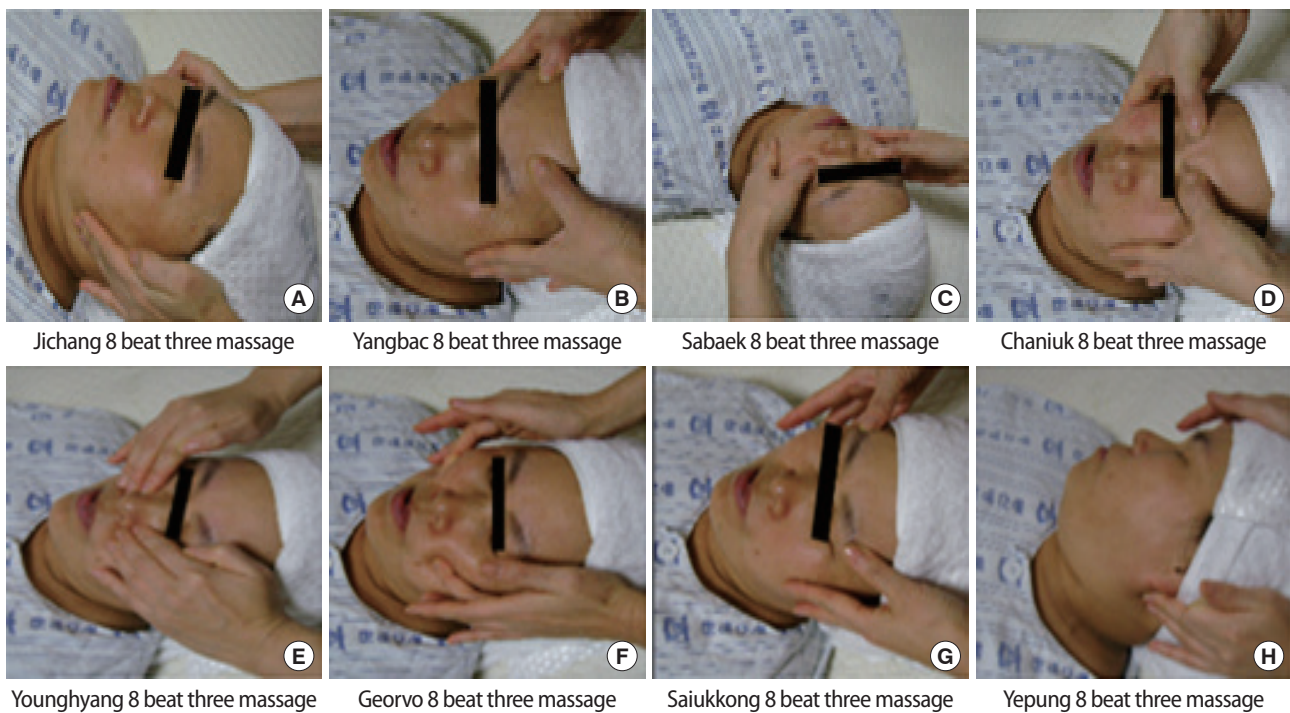
Figure 1. Acupressure massages method.

A. Jichang 8 beat three massage
B. Yangbac 8 beat three massage
C. Sabaek 8 beat three massage
D. Chaniuk 8 beat three massage
E. Younghyang 8 beat three massage
F. Georvo 8 beat three massage
G. Saiukkong 8 beat three massage
H. Yepung 8 beat three massage

lated according to the flow of meridians. Techniques such as friction of circling and touching with the middle finger, compression of pressing the skin tenderly, and kneading of rubbing and touching the skin like lifting) were used (Figure 1).

The experimental group had a total of six facial acupressure massages and no massage was given to the control group for 2 weeks. General characteristic, DITI, the recovery of facial paralysis status, subjective symptoms, and depression of both groups were measured before and after the treatment.

6. Data analysis

Data collected were analyzed using SPSS WIN 12.0. General characteristics of two groups were analyzed by frequency and percent (%) and a homogeneity test between two groups was analyzed by X^2 test, Fisher's exact test, and t-test. ANCOVA were also used. Cronbach's α was used to analyze the reliability of instruments

RESULTS

1. Homogeneity of the experimental group and the control group

Homogeneity of general characteristics and dependent variables was tested between the experimental group and the control group. There were no statistically significant differences at 5% significance level. The two groups were found to be homogeneous (Tables 1, 2).

2. Effect on DITI

From the ANCOVA results using the pre-test score as covariate, significant difference between the two groups was found (F = 8.56, p = .005). The experimental group showed less difference in DITI between the affected and the unaffected sides after the acupressure massage. The difference decreased from 0.31˚C (pre-experiment) to 0.14˚C (post-experiment) while the difference in the control group changed from 0.25˚C to 0.20˚C (Table 3).

3. Effect on recovery of facial paralysis status

Inconsistent results were obtained according to the measuring tools. The change in facial paralysis status measured by H-B grading system, no significant difference was found between the two groups (F = 1.99, p = .164). The average score of the experimental group decreased from 4.77 (pre-experiment) to 3.57 (post-experiment) while the score de-

Table 1. Homogeneity of the General Characteristics

Variables	Characteristics	Experimental group (n = 30) N (%)	Control group (n = 30) N (%)	p
Age (year)	40 >	7 (23.3)	9 (30.0)	.939[‡]
	40-49	8 (26.7)	9 (30.0)	
	50-59	8 (26.7)	6 (20.0)	
	60-69	4 (13.3)	4 (13.3)	
	70 ≤	3 (10.0)	2 (6.7)	
Gender	Male	12 (40.0)	16 (53.3)	.438[†]
	Female	18 (60.0)	14 (46.7)	
Religion	Yes	14 (46.7)	20 (66.7)	.192[†]
	No	16 (53.3)	10 (33.3)	
Paralysis	Right	18 (60.0)	20 (66.7)	.789[†]
	Left	12 (40.0)	10 (33.3)	
History	Yes	27 (90.0)	26 (86.7)	.500[‡]
	No	3 (10.0)	4 (13.3)	

[†]p-value from $\mathcal{X}^2$ test, [‡]p-value from Fisher's exact test

Table 2. Homogeneity of the Outcome Variables

Variables	Characteriatics	Experimental group (n = 30) N (%)	Control group (n = 30) N (%)	t	p
DITI (℃)	Total	0.30 ± 0.211	0.25 ± 0.153	1.10	.278
	Chanjuk	0.55 ± 0.225	0.46 ± 0.121	1.24	.220
	Sabaek	0.71 ± 0.393	0.58 ± 0.331	0.48	.630
	Georyo	0.62 ± 0.280	0.48 ± 0.244	0.68	.501
	Younghyang	0.29 ± 0.274	0.27 ± 0.214	1.87	.066
	Jichang	0.60 ± 0.261	0.33 ± 0.215	2.50	.015
	Hyeopgeo	0.43 ± 0.360	0.35 ± 0.255	0.37	.710
Recovery[†]	H-B	4.77 ± 0.626	4.50 ± 0.777	1.46	.149
	FNGS	4.50 ± 1.225	4.43 ± 1.135	0.22	.828
Subjective symptoms		2.48 ± 0.474	2.57 ± 0.624	0.65	.517
Depression		45.90 ± 8.603	48.23 ± 5.223	1.27	.209

[†]Recovery = Recovery of facial paralysis, H-B = House-Brackmann Grading System; FNGS = Facial Nerve Grade Systems by Brackmann; DITI = Digital infrared thermographic imaging

Table 3. Comparisons of DITI between Groups

Variables (℃)	Group	Before Mean ± SD	After Mean ± SD	F[†]	p
Total	Experimental group (n = 30)	0.31 ± 0.212	0.14 ± 0.117	8.56	.005
	Control group (n = 30)	0.25 ± 0.153	0.20 ± 0.125		
Chanjuk	Experimental group (n = 30)	0.55 ± 0.225	0.18 ± 0.118	43.71	< .001
	Control group (n = 30)	0.46 ± 0.121	0.37 ± 0.131		
Sabaek	Experimental group (n = 30)	0.71 ± 0.393	0.27 ± 0.335	1.22	.275
	Control group (n = 30)	0.58 ± 0.331	0.30 ± 0.292		
Georyo	Experimental group (n = 30)	0.62 ± 0.280	0.20 ± 0.147	11.85	.001
	Control group (n = 30)	0.48 ± 0.244	0.30 ± 0.220		
Younghyang	Experimental group (n = 30)	0.29 ± 0.274	0.25 ± 0.217	2.92	.093
	Control group (n = 30)	0.27 ± 0.214	0.37 ± 0.286		
Jichang	Experimental group (n = 30)	0.60 ± 0.261	0.20 ± 0.187	8.62	.005
	Control group (n = 30)	0.33 ± 0.215	0.25 ± 0.193		
Hyeopgeo	Experimental group (n = 30)	0.43 ± 0.360	0.31 ± 0.335	8.23	.006
	Control group (n = 30)	0.35 ± 0.255	0.12 ± 0.185		

[†]ANCOVA was conducted using the pre-score of the subjects as covariate, DITI = Digital infrared thermographic imaging

Table 4. Comparisons of Recovery of Facial Paralysis between Groups

Variables	Group	Before Mean ± SD	After Mean ± SD	F†	p
H-B	Experimental group (n = 30)	4.77 ± 0.626	3.57 ± 0.774	1.99	.164
	Control group (n = 30)	4.50 ± 0.777	3.73 ± 0.691		
FNGS	Experimental group (n = 30)	4.50 ± 1.225	2.87 ± 0.860	26.81	< .001
	Control group (n = 30)	4.43 ± 1.135	3.67 ± 0.994		

†ANCOVA was conducted using the pre-score of the subjects as covariate,
H-B = House-Brackmann Grading System; FNGS = Facial Nerve Grade Systems by Brackmann

Table 5. Comparisons of Subjective Symptoms & Depression between Groups

Variables	Group	Before Mean ± SD	After Mean ± SD	F†	p
Subjective symptoms	Experimental group (n = 30)	2.48 ± 0.474	1.92 ± 0.424	6.13	.016
	Control group (n = 30)	2.58 ± 0.624	2.18 ± 0.527		
Depression	Experimental group (n = 30)	45.90 ± 8.602	42.13 ± 8.485	16.39	< .001
	Control group (n = 30)	48.23 ± 5.223	47.93 ± 5.356		

†ANCOVA was conducted using the pre-score of the subjects as covariate.

Table 6. Comparisons of Lower Part Depression between Groups

Variables	Group	Before Mean ± SD	After Mean ± SD	t	p
No depression	Experimental group (n = 21)	41.73 ± 6.243	38.32 ± 6.992	4.62	< .001
	Control group (n = 21)	45.43 ± 2.521	45.95 ± 4.748	-0.60	.558
Mild depression	Experimental group (n = 9)	55.78 ± 3.073	51.00 ± 2.397	5.25	.001
	Control group (n = 9)	54.78 ± 52.563	52.55 ± 3.609	1.82	.107

creased from 4.50 to 3.73 in the control group.

A statistically significant difference was found between the two groups when it was measured by FNGS (F = 26.81, p < .001). The average score of the experimental group decreased from 4.50 (pre-experiment) to 2.87 (post-experiment) and the score decreased from 4.43 to 3.67 in the control group (Table 4).

4. Effect on subjective symptoms

Subjective symptom score decreased from 2.48 (pre-experiment mean) to 1.92 (post-experiment mean) in the experimental group mean, while it decreased from 2.58 to 2.18 in the control group mean. This result was statistically significant from an ANCOVA using the pre-score as the covariate (F = 6.13, p = .016) (Table 5).

5. Effect on depression

Depression scores decreased from 45.90 (pre-experiment) to 42.13 (post-experiment) and from 48.23 to 47.93 in the experimental and the control group, respectively. This result was statistically significant (F = 16.39, p < .001) (Table 5).

Paired-t-test was done to the lower part depression members and the result showed that there was some difference in no depression part from 41.73 (pre-experiment) to 38.32 (post-experiment) in the experimental group (n = 21) and in the control group (n = 21), there was little change from 45.43 (pre-control) to 45.95 (post-control). So only the result of experimental group was significant (t = 4.62, p < .001). In mild depression group (n = 9), there was some difference from 55.78 (pre-experiment) to 51.00 (post-experiment) in the experimental group and in the control group (n = 9), there was a little change from 54.78 (pre-control) to 52.55 (post-control). So only the result of experimental group was significant (t = 5.25, p = .001) (Table 6).

DISCUSSION

This study was attempted to examine the effects of acupressure massage on DITI changes, the recovery of facial paralysis, subjective symptoms, and depression in Bell's palsy patients and develop nursing intervention to improve their recovery of facial paralysis and mental health. As a result, temperature difference in between affected and unaffected sides of the face was decreased, the recovery of facial paralysis was increased, and subjective symptoms, and depression were decreased in Bell's palsy patients receiving acupressure massage.

There are few researches applying acupressure massage to Bell's palsy patients and investigating its effects, especially on a DITI change, facial paralysis status, subjective symptoms, and depression. Although thermal changes diagnosed by DITI is an easy and non-invasive indicator to objectively measure the recovery of facial nerve, there are no researches on the effect in the nursing society.

While there are few researches using DITI in the nursing society, the Korean medicine has actively conducted researches using DITI Results on the prognosis of peripheral Bell's palsy using DITI suggest that quicker and better healing is associated with a normal pattern without bilateral differences and higher temperature in the affected side than the affected side [14]. DITI is used as an indicator of treatment effect on Bell's palsy objectively. The study on the skin temperature using DITI for the patients with TMJ (temporomandibular joint) disorders reported that temperature difference before and after treatment was statistically significantly different between the affected and the unaffected sides. It agrees with the results of this study [27].

In this study, the effects of acupressure massage on facial paralysis status in Bell's palsy patients varied with measuring instruments. The results using H-B grading system suggested that although a facial paralysis score was slightly lower in the experimental group than in the control group, there was no statistically significant difference between the two [22]. It agrees with the results by Kim and Jung [12] who performed facial acupressure massage for one week using the same instrument in Bell's palsy patients and did not find a significant difference. They reported that the recovery of facial paralysis score was higher in the experimental group than in the control group but no statistically significant results were founds, and suggested extending a massage period to two weeks [12].

The H-B Grading System used frequently in clinics to assess facial paralysis levels, has been widely used internationally due to its convenience

that simply and synthetically assesses facial paralysis in short time [22]. It is criticized for its grader dependency and simplicity. While it is good to observe in subjective and qualitative aspects by assessing the whole facial paralysis status by a 6-step non-sequential method, it does not reflect a variety of facial paralysis conditions and short-term minute changes and does not quantify facial paralysis levels. To make up for these problems, the FNGS developed by House and Brackmann [22] quantifies the distance of moving eyebrows (eyebrow movements and the distance of moving mouth lip movements [23].

This study quantitatively evaluated eyebrow and lip movements by FNGS and obtained a statistically significant result. This researcher considers that FNGS is a more objective and reliable instrument than H-B Grading System and thus places trust in this result and agrees with previous researches objecting to the objectivity of H-B Grading System [23].

Lee and Kim [8] gave facial acupressure massage to stroke patients for 2 weeks and measured the vertical difference of the edge of the right and left side lips while the subject says 'Ee', and patients' subjective expression such as speech expression, chewing, and drooling with a 7-point scale. Their results also agreed with this study.

It was found that facial acupressure massage was effective on removing patients' subjective symptoms in Bell's palsy patients. The results were consistent with other researches where subjective symptoms were examined after acupressure massage was performed on Bell's palsy patients. Jung and Kang [11] examined the effect of facial acupressure massage in peripheral facial paralysis patients to alleviate subjective symptoms and anxiety and reported statistical significance. Therefore, it is safe to argue that the subjective symptoms of Bell's palsy decreased after acupressure massage. Nevertheless, as there are no researches reporting a decrease in the subjective symptoms of Bell's palsy, the effect of acupressure massage should be tested continuously and repeatedly. Limitation of the Study as only idiopathic Bell's palsy patients were analyzed, there is a limit to apply to Bell's palsy patients with different etiology.

In this study, the value of depression was shown that the number of no depression was 21 subjects among 30 experimental and control group members respectively, mild depression was 9 among 30 experimental and control group members respectively, given Zung, Richards and Short [26] definition, no depression (< 50), mild depression (50-59) and moderate to severe depression ($> = 60$). In the two depression areas, there were statistically significant reductions of depression value only in the experimental group. It was also found that facial acupressure mas-

sage was effective to remove patients' depression in idiopathic Bell's palsy patients ($p < .001$). This result agrees with results by Choi et al. [7] reporting that upper limb massage applied to hemiplegia patients was effective to decrease depression. It is understandable because massage forms strong trust by skinship with the subject and gives physical, emotional, and psychological relaxation.

This study gave Bell's palsy patients an acupressure massage to reveal the effect on facial paralysis recovery. The results accorded with those of studies that suggested the increase in facial paralysis recovery using various intervention approaches along with an acupressure massage for Bell's palsy patients such as a study using Doin Gigong exercise [28] and a study applying laugh therapy [29]. We have some limits in seeing the exact results of depression as there are various kinds of objects who have different levels of depression value.

Acupuncture is to make the circulation of Qi smooth by stimulating acupoints, reflex points located along meridians (a channel of Qi). Meridian massage circulates blood and endocrine secretion and makes muscle, bone, and nervous system active by pressing acupoints distributed in the body surface by fingers and has the same effects as acupuncture [12].

We found the effectiveness of acupressure massage on subjective symptoms and depression as well as recovery of facial paralysis very meaningful because psychological usefulness of nursing intervention is often overlooked in medical treatment, and the need to develop a variety of nursing intervention has been continuously raised to decrease depression. As the subjects were inpatients in Korean medical hospital, it should be careful to generalize the findings to inpatients in Western hospitals.

CONCLUSION

Acupressure massage in Bell's palsy patient was found to be effective in relieving facial paralysis, alleviating subjective symptoms, and decreasing depression. Acupressure massage is a non-invasive intervention that is easy to learn and easy to apply. Acupressure massage can be especially helpful in the field of nursing.

Use of DITI as an instrument to objectively measure the effect of acupressure massage given to Bell's palsy is a meaningful contribution to nursing research. It is suggested that objective measurements such as DITI be used more often in nursing.

Based on the findings, some suggestions follow.

We suggest further research on the effect of acupressure massage on facial paralysis patients with varying application periods. However, since there are no researches on decreased subjective symptoms in facial paralysis patients, it is necessary to test the effects of acupressure massage continuously and repeatedly. To certify the effectiveness of interventions for depression, it is necessary to proceed with follow up study with those who have high score depression. Finally, further research is suggested on differential DITI changes, i.e. how the recovery of facial paralysis status is changed when DITI goes up or down in Bell's palsy patients.

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