Original Article

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Prognostic Factors of Idiopathic Facial Palsy: A Retrospective Study

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[Abstract]

Objectives : The purpose of this study was to evaluate the clinical prognostic factors affecting facial palsy in 98 idiopathic facial palsy patients who were hospitalized and treated in 2015, using retrospective statistical analysis.

Methods : We investigated patients with idiopathic facial nerve palsy, admitted to a Korean medical hospital in 2015, and examined patients' variables and therapeutic variables. For analysis of clinical data, an independent sample *t*-test, analysis of variance (ANOVA), and simple regression analysis were performed using IBM SPSS version 24.0.

Results : 1. The initial degree of facial palsy showed statistical significance with age. The older the age, the more severe the initial palsy.

2. Following treatment degree of facial palsy was statistically significant with age, hypertension, and fasting blood sugar (FBS). The higher the value, the slower the recovery from facial palsy. There was a statistical significance with the number of treatments in a Korean medical hospital. The more frequent the treatment, the faster the facial palsy recovery.

3. Degree of facial palsy after 12 months was statistically significant with age, hypertension, diabetes, FBS, and the initial severity of facial palsy. The higher the value, the slower the facial palsy recovery.

4. Sex, left or right sided palsy, alcohol consumption, smoking, history of facial palsy, season of onset, total number of treatments and bio chemistry (BC), complete blood cell count (CBC), urinalysis (UA) factors had no statistical significance with prognosis of facial palsy.

Conclusion : Age, season of onset, hypertension, diabetes, FBS, initial severity of facial palsy, and the number of treatments at a Korean medical hospital showed statistical significance. The number of treatments at the Korean medical hospital positively correlated with facial palsy prognosis, and the others variables showed a negative correlation with facial palsy prognosis.

Key words :
Facial palsy;
Prognostic factors;
Retrospective analysis

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Ⅰ. Introduction

Bell's palsy is a paralysis or weakness of the muscle on one side of face due to facial nerve damage. The most common symptoms in patients with Bell's palsy are facial palsy or asymmetry. And it sometimes accompanied by other symptoms, such as otalgia, loss of taste, dry eye discomfort, tinnitus, hearing loss, and excessive tears[1].

The unilateral facial weakness associated with Bell's palsy is thought to result from facial nerve inflammation and edema induced by reactivation of the Herpes simplex or Varicella zoster virus. In the temporal bone, the facial nerve travels in a narrow canal; and swelling of the nerve may result in compression and subsequent damage[2,3].

Diagnosis of Bell's palsy is based on excluding other causes of unilateral facial paralysis, and 30% to 60% of cases of facial palsy result from an underlying disorder that mimics Bell palsy, including a central nervous system lesion (stroke, demyelinating disease), Ramsay Hunt syndrome, trauma, granulomatous disease, otitis media, cholesteatoma, and Guillain-Barre syndrome. Many of these conditions have associated features that help distinguish them from Bell's palsy[4].

The treatment of Bell's palsy focuses on maximizing recovery and minimizing associated complications. In Korean medicine, the treatment of Bell's palsy is based on acupuncture, moxibustion, and combined with herbal medicine[5]. There are some clinical reports have indicated that electroacupuncture and moxibustion are effective for Bell's palsy[6,7]. The conventional medical treatments of Bell's palsy are corticosteroids, antiviral therapy, and surgical decompression, etc. The main treatment of Bell's palsy is steroid prescription. The anti-inflammatory effect of steroids is assumed to minimize facial nerve swelling, compression and damage, so reducing the length of recovery time[8,9]. Recently clinical research has reported on attempts to implement a combination of more traditional approaches to medicine derived from Korea and conventional medical approaches[5,10].

The annual incidence of Bell's palsy is 15-30 per 100,000 person, with no predilection for sex or ethnicity. It can affect people at any age, but the incidence is slightly higher after age 40[11].

Most Bell's palsy patients recover completely. In adults, up to 30% of untreated patients fail to make a complete recovery and have residual symptoms after 6 months. Furthermore, 7 to 12% of patients have a recurrence[4,12].

Facial dysfunction has a dramatic effect on a patient's appearance, psychological wellbeing and quality of life. Therefore, being able to predict of a Bell's palsy patient's prognosis and recovery is very valuable. There have been many studies of Bell's palsy treatments in relation to acupuncture, moxibustion, herbal medicine[5-7] and Bell's palsy diagnosis of ENG[13], EMG[13,14], and HRV[14]. However retrospective studies of factors related to Bell's palsy prognosis are uncommon. This retrospective study statistically analyzed factors related to Bell's palsy prognosis and prepare basis of Bell's palsy progress.

Ⅱ. Subjects and Methods

1. Participants

The study included 98 patients diagnosed with Bell's palsy admitted to a Korean medical hospital in 2015. All patients were diagnosed as having acute facial palsy (only of the idiopathic type, excluding central, infectious, and traumatic palsy) and were admitted within 1 week of onset and had taken corticosteroid medication. Those who could be contacted by telephone after one year were included in the study.

2. Methods

1) Data source

Data were collected from medical records and a telephone survey. The House-Brackmann (HB) scale was used to determine the degree of Bell's palsy severity (Table 1). Collected data included patients' personal information, blood test and urinalysis results, and the number of treatments. (Table 2)

2) Statistical analysis

To analyze the statistical relationship between the clinical data and the degree of Bell's palsy severity(HB scale), IBM SPSS version 24.0 was used. An independent sample *t*-test was used to verify the correlation between sex, the affected side of face, alcohol consumtion, smoking, diabetes mellitus, hypertension, history of Bell's Palsy, blood test and urinalysis, using the HB scale for initial, following treatment, and after 12 months.

Analysis of variance (ANOVA) was used to confirm a relationship between the season of onset, age and the HB scale at initial, following treatment, and after 12 months.

Simple regression analysis was used to confirm a correlation between the total number of treatments at a Korean medical hospital and the total number

Table 1. House-Brackmann (HB) Facial Nerve Grading System

Grade	Description	Characteristics
I	Normal	Normal facial function all areas
II	Mild dysfunction	Gross -Slight weakness is noted on close inspection may have a slight synkinesis At rest -Normal symmetry and tone Motion -Forehead : Moderate to good function -Eye : Complete closure with minimal effort -Mouth : Slightly asymmetry
III	Moderate dysfunction	Gross -Obvious but not disfiguring difference between both sides, noticeable but not severe synkinesis, contracture, or hemifacial spasm At rest -Normal symmetry and tone Motion -Forehead : Slight to moderate movement -Eye : Complete closure with effort -Mouth : Slightly weak with maximum effort
IV	Moderate severe dysfunction	Gross -Obvious weakness and/or disfiguring asymmetry At rest -Normal symmetry and tone Motion -Forehead : No movement -Eye : Incomplete closure -Mouth : Slightly weak with maximum effort
V	Severe dysfunction	Gross -Only barely perceptible At rest -Asymmetry Motion -Forehead : No movement -Eye : Incomplete closure -Mouth : Slight movement

Table 2. Research data

Data		Composition
Related with patient		Sex, Age, Palsy affected side of the face, alcohol consumption, Smoking, Season of onset, Hypertension, Diabetes, A past history of Bell's palsy
Treatment number		Number of treatments in a Korean medical hospital (Total number of inpatient and outpatient treatments), Total number of treatments for Bell's palsy (Number of treatments in a Korean medical hospital and the number of treatments in other hospitals)
Blood test	BC	Total protein, Albumin, T.bilirubin, AST, ALT, ALP, Cholesterol, LDH, FBS
	CBC	WBC, RBC, Hemoglobin, Hematocrit, ESR, Platelet, MCV, MCH, MCHC, RDW, PDW, PCT, MPV
Urinalysis		Protein, S.G, P.H, Leukocyte, Nitrite, Glucose, Urobilinogen, Ketone, Bilirubin, Blood, RBC, WBC, Epithelial

of treatments within 1 year, using the HB scale at initial, following treatment, and after 12 months. The statistical significance level of this study was set at a p-value under 0.05($p<0.05$).

Ⅲ. Results

1. Clinical analysis of Patients

1) Sex

The 98 Bell's palsy patients comprised 39 males and 59 females. Statistical analysis of sex and the HB scale showed no significance between sex and the HB scale at initial, following treatment, and after 12 months ($p>0.05$)(Table 3).

2) Age

Bell's palsy patients were divided into six groups. The groups comprised a 0-29 year old group (N=12), 30-39 year old group (N=16), 40-49 year old group (N=22), 50-59 year old group (N=20), 60-69 year old group (N=15), and an older than or equal to 70 years of age group (N=13). Statistical analysis of the age groups (ANOVA) and the initial HB scale grading showed statistical significance ($p<0.05$). There was also statistical significance for HB scale following treatment and after 12 months

Table 3. The sex effects on Bell's palsy patients*

	Sex	Bell's palsy (N=98)	Mean (M)	Standard deviation (SD)
Initial	Male	39	4.77	0.742
HB scale	Female	59	4.69	0.701
t(p-value)†		0.502 (0.617)		
Following Treatment	Male	39	3.26	1.163
HB scale	Female	59	3.63	1.097
t(p-value)		−1.598 (0.113)		
After 12 months	Male	39	1.64	1.063
HB scale	Female	59	1.81	1.090
t(p-value)		−0.774 (0.441)		

* Statistical significance was evaluated using an independent sample t-test.
† ** $p<0.05$, *** $p<0.01$.

Table 4. The age group effects on Bell's palsy patients*

		Initial HB scale	Following Treatment HB scale	After 12 month HB scale
Age group	N	M	M	M
0–29	12	4.17[a†]	2.67[a]	1.25[a]
30–39	22	4.69[b]	3.63[bc]	1.38[a]
40–49	16	4.50[ab]	2.95[ab]	1.23[a]
50–59	20	4.75[b]	3.70[bc]	2.15[b]
60–69	15	4.87[b]	3.87[c]	1.80[ab]
70–	13	5.46[c]	4.15[c]	2.85[c]
F(p–value)‡		6.036 (0.000)***	4.274 (0.002)***	6.716 (0.000)***

*Statistical significance was evaluated using ANOVA and Duncan's post–hoc analysis.
†a, b, c are Duncan's post–hoc analysis results, meaning a>b>c.
‡ **p<0.05, ***p<0.01.

(p<0.05) (Table 4).

According to Duncan's new multiple range test (MRT) for post–hoc analysis, the initial HB scale grade in the groups, other than the 0–29 year old group, showed increased average grade of HB scale, which suggests that the older the patient, the more severe the initial palsy. Using Duncan's post–hoc analysis on the HB scale grade following treatment showed an increased average grade of HB scale in groups other than 0–29 years old, meaning that older the patient, the slower the recovery rate of the palsy. Duncan's post–hoc analysis on the HB scale after 12 months showed similar recovery rates in age groups with similar averages of HB scale: 0–29 year old, 30–39 year old, and 40–49 year old. These age groups showed a better recovery rate than the older age groups. Patients greater than or equal to 50 years of age showed slower rates of recovery (the 60–69 year old group was both in the a and b sections within Duncan's post–hoc analysis, which lowers statistical significance) (Table 4).

3) Alcohol consumption and smoking

There were 21 drinkers and 77 nondrinkers among the 98 Bell's palsy patients, and 17 smokers and 81 non–smokers. Drinking and smoking had no statistical significance with the initial HB scale grade after statistical analysis(p>0.05). Furthermore there was no statistical significance with the HB scale following treatment and after 12 months after (p>0.05) (Table 5,6).

4) Facial palsy affected side of the face

Bell's palsy had occurred on the right side of the face in 51 patients, and on the left side in 47 patients. The 40 male patients with Bell's palsy comprised 20 patients with right palsy and 20 patients with left palsy. The 58 female patients with Bell's palsy comprised 31 right palsy and 27 left palsy patients (Table 7).

Statistical analysis of the affected side of the face in the Bell's palsy patients showed no statistical significance with HB scale grade (p>0.05). Also, there was no statistical significance shown with the HB scale following treatment and after 12 months (p>0.05) (Table 8).

5) Season of onset

Seasons were classified into spring (March to May, N=22), summer (June to August, N=23), fall (September to November, N=25) and winter (December to February, N=28). The season of onset showed no statistical significance with the initial HB scale grade, following treatment, and after 12 month (p>0.05) (Table 9).

Table 5. The effects of alcohol consumption on Bell's palsy patient*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Nondrinker	77	4.69	0.712
HB scale	Drinker	21	4.86	0.727
t(*p*-value)†		−0.959 (0.340)		
Following Treatment	Nondrinker	77	3.51	1.166
HB scale	Drinker	21	3.38	1.024
t(*p*-value)		0.448 (0.655)		
After 12 months	Nondrinker	77	1.79	1.092
HB scale	Drinker	21	1.57	1.028
t(*p*-value)		0.831 (0.408)		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 6. The effects of smoking on Bell's palsy patients*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Nonsmoker	81	4.70	0.679
HB scale	Smoker	17	4.82	0.883
t(*p*-value)†		−0.626 (0.533)		
Following Treatment	Nonsmoker	81	3.51	1.108
HB scale	Smoker	17	3.35	1.272
t(*p*-value)		0.505 (0.615)		
After 12 months	Nonsmoker	81	1.79	1.104
HB scale	Smoker	17	1.53	0.943
t(*p*-value)		0.906 (0.367)		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 7. The characteristics of the palsy affected side of face in Bell's palsy patients

	Sex	N	%
Right	Men	20	20.4
	Women	31	31.6
Left	Men	20	20.4
	Women	27	27.6

6) Hypertension

28 patients had hypertension and 70 patients did not. Statistical analysis of the hypertension history of Bell's palsy patients showed no statistical significance with the initial HB scale($p>0.05$). However, there was statistical significance shown for a history of hypertension in relation to the HB scale grade following treatment and after 12 months ($p<0.05$) (Table 10). This result suggests that a history of hypertension slows the recovery of facial palsy.

Table 8. The palsy direction effects on Bell's palsy*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Left	47	4.72	0.743
HB scale	Right	51	4.73	0.695
t(*p*-value)†		−0.014 (0.989)		
Following Treatment	Left	47	3.47	1.231
HB scale	Right	51	3.49	1.046
t(*p*-value)		−0.096 (0.924)		
After 12 month	Left	47	1.70	1.102
HB scale	Right	51	1.78	1.064
t(*p*-value)		−0.376 (0.708)		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 9. The season of onset effects on Bell's palsy*

		Initial HB scale	Following Treatment HB scale	After 12 months HB scale
Season	N	M	M	M
Spring	22	$4.68^{a\dagger}$	3.55^{ab}	1.68^{a}
Summer	23	4.91^{a}	3.39^{ab}	1.91^{a}
Fall	25	4.60^{a}	3.08^{a}	1.52^{a}
Winter	28	4.71^{a}	3.86^{b}	1.86^{a}
F(*p*-value)‡		0.809(0.492)	2.227(0.090)	0.669(0.573)

* Statistical significance was evaluated using ANOVA and Duncan's post-hoc analysis.
† a, b are Duncan post-hoc analysis results, meaning a>b.
‡ ** $p<0.05$, *** $p<0.01$.

Table 10. The hypertension effects on Bell's palsy patients*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Normal	70	4.69	0.733
HB scale	Hypertension	28	4.82	0.670
t(*p*-value)†		−0.848(0.399)		
Following treatment	Normal	70	3.30	1.095
HB scale	Hypertension	28	3.93	1.120
t(*p*-value)		−2.551(0.012)**		
After 12 month	Normal	70	1.53	0.896
HB scale	Hypertension	28	2.29	1.301
t(*p*-value)		−3.299(0.001)***		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

7) Diabetes mellitus

From the 98 patients, 17 patients had diabetes mellitus and 81 patients did not. A statistical analysis of diabetes history of Bell's palsy patients showed no statistical significance with the initial HB scale and following treatment ($p>0.05$). However, there was statistical significance between a history of diabetes and the HB scale after 12 months ($p<0.05$) (Table 11). This result indicates that a history of diabetes slows the recovery of facial palsy.

8) Past history of Facial palsy

Of the 98 Bell's palsy patients, 11 patients had a history of Bell's palsy. A history of Bell's palsy showed no statistical significance with the initial HB scale grade, following treatment, and after 12 months ($p>0.05$) (Table 12). This result shows that a past history of facial palsy does not affect the recovery of facial palsy.

9) Degree of initial Bell's palsy severity

Among the 98 Bell's palsy patients, 3 patients

Table 11. The diabetes effects on Bell's palsy patients*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Normal	81	4.69	0.701
HB scale	Diabetes	17	4.88	0.781
t(*p*-value)†		−1.002 (0.319)		
Following Treatment	Normal	81	3.40	1.069
HB scale	Diabetes	17	3.88	1.364
t(*p*-value)		−1.626 (0.107)		
After 12 months	Normal	81	1.62	0.969
HB scale	Diabetes	17	2.35	1.367
t(*p*-value)		−2.637 (0.010)**		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 12. A history of Bell's palsy effects on Bell's palsy patients*

		N (=98)	Mean (M)	Standard deviation (SD)
Initial	Normal	87	4.70	0.717
HB scale	Recurrence	11	4.91	0.701
t(*p*-value)†		−0.908 (0.366)		
Following Treatment	Normal	87	3.49	1.119
HB scale	Recurrence	11	3.36	1.286
t(*p*-value)		0.359 (0.721)		
After 12 months	Normal	87	1.76	1.089
HB scale	Recurrence	11	1.64	1.027
t(*p*-value)		0.353 (0.725)		

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

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were evaluated as HB scale step 3, 33 patients as 4, 50 patients as 5, and 12 patients as 6 (Table 13). The degree of initial Bell's palsy severity had statistical significance with the HB scale grade following treatment and after 12 months ($p<0.05$). According to Duncan's post-hoc analysis, the more severe the degree of initial Bell's palsy, the lower the recovery rate (Table 14).

2. Clinical analysis of blood and urine tests

The purpose of analyzing of blood and urine tests is to identify the statistical significance of the initial condition of Bell's palsy patients in relation to their prognosis.

Table 13. The HB scales of Bell's palsy patients

Initial HB scale		Following Treatment HB scale			After 12 months HB scale		
Scales	N	Scales	N	%	Scales	N	%
3	3	1	2	66.7	1	3	100
		2	1	33.3	2	–	–
4	33	1	1	3.0	1	23	69.7
		2	10	30.3	2	6	18.2
		3	10	30.3	3	4	12.1
		4	12	36.4	4	–	–
5	50	1	1	2.0	1	30	60.0
		2	8	16.0	2	3	6.0
		3	7	14.0	3	14	28.0
		4	20	40.0	4	3	6
		5	14	28.0	5	–	–
6	12	1	–	–	1	5	41.2
		2	–	–	2	1	8.3
		3	3	25.0	3	2	16.7
		4	6	50.0	4	2	16.7
		5	3	25.0	5	2	16.7

Table 14. The initial HB scales effects on Bell's palsy patients*

	After Treatment HB scale	After 12 months HB scale
Inital HB scale	M	M
3	$1.33^{a\dagger}$	1.00^{a}
4	3.06^{b}	1.42^{a}
5	3.76^{b}	1.80^{ab}
6	4.00^{b}	2.58^{b}
F(p-value)‡	8.596 (0.000)***	4.320 (0.007)**

*Statistical significance was evaluated using ANOVA and Duncan's post-hoc analysis.
†a, b are Duncan post-hoc analysis results, meaning a>b.
‡ **$p<0.05$, ***$p<0.01$.

1) Blood chemistry (BC)

BC (blood chemistry) consists of total protein, albumin, total bilirubin, aspartate aminotransferase (AST), alanine transferase (ALT), alkaline phosphatase (ALP), Cholesterol, low density lipoprotein (LDL), and FBS. Only FBS showed a statistical significance with HB scale grade following treatment and after 12 months ($p<0.05$). No other BC factors showed a statistical significance with the initial HB scale grade, following treatment, and after 12 months ($p>0.05$) (Table 15). ALP and LDL could not be statistically analyzed due to small abnormal number of patients with abnormal values (N<5).

2) Complete blood cell count (CBC)

A CBC consists of white blood cell (WBC), red blood cell (RBC), hemoglobin, hematocrit, erythrocyte sedimentation rate (ESR), platelet, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width (RDW), platelet distribution width (PDW), plateletcrit (PCT), and mean platelet volume (MPV). All the factors of CBC had no statistical significance with HB scale at initial, following treatment, and after 12 months ($p>0.05$) (Table 16). Platelet, RDW, and PDW could not be statistically analyzed due to small number of patients with abnormal values (N <5).

3) Urinalysis

UA (Urinalysis) involves analyzing urine, which comprises protein, specific guavity (S.G), power of hydrogen (P.H), leukocyte, nitrite, glucose, urobilinogen, ketone, bilirubin, blood, RBC, WBC, and epithelial. No UA factors showed any statistical significance with the initial HB scale grade, following treatment, and after 12 months ($p>0.05$) (Table 17). Levels of P.H, nitrite, urobilinogen, and bilirubin could not be statistically analyzed due to the small number of patients with abnormal values (N<5).

Table 15. The blood chemisty (BC) factor effects on Bell's palsy patients*

			Initial HB scale	Following Treatment HB scale	After 12 months HB scale
Total protein	Normal (N=76) Abnormal (N=22)	t(*p*-value)†	0.316 (0.752)	−0.107 (0.915)	−0.585 (0.560)
Albumin	Normal (N=97) Abnormal (N=1)	t(*p*-value)	−0.386 (0.701)	−1.355 (0.179)	−1.173 (0.244)
T.bilirubin	Normal (N=93) Abnormal (N=5)	t(*p*-value)	1.042 (0.300)	0.565 (0.574)	−0.541 (0.589)
AST	Normal (N=94) Abnormal (N=4)	t(*p*-value)	0.639 (0.524)	0.863 (0.390)	0.462 (0.645)
ALT	Normal (N=87) Abnormal (N=11)	t(*p*-value)	0.881 (0.381)	−0.204 (0.839)	−0.238 (0.812)
ALP	Normal (N=97) Abnormal (N=1)	t(*p*-value)	−	−	−
Cholesterol	Normal (N=49) Abnormal (N=49)	t(*p*-value)	0.141 (0.888)	−1.526 (0.130)	−0.093 (0.926)
LDL	Normal (N=98) Abnormal (N=0)	t(*p*-value)	−	−	−
Glucose(FBS)	Normal (N=42) Abnormal (N=55)	t(*p*-value)	−1.233 (0.221)	−2.517 (0.014)**	−2.286 (0.024)**

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 16. The complete blood cell count (CBC) factors effects on Bell's palsy patients*

			Initial HB scale	Following treatment HB scale	After 12 months HB scale
WBC	Normal (N=75) Abnormal (N=23)	t(*p*-value)†	−0.112 (0.911)	−0.834 (0.406)	−0.411 (0.682)
RBC	Normal (N=78) Abnormal (N=20)	t(*p*-value)	0.171 (0.865)	0.793 (0.430)	0.672 (0.503)
Hemoglobin	Normal (N=80) Abnormal (N=18)	t(*p*-value)	0.743 (0.459)	−0.774 (0.441)	−0.384 (0.702)
Hematocrit	Normal (N=84) Abnormal (N=14)	t(*p*-value)	1.689 (0.094)	−0.072 (0.942)	−0.152 (0.279)
ESR	Normal (N=74) Abnormal (N=24)	t(*p*-value)	−1.526 (0.130)	−2.219 (0.029)	−0.898 (0.372)
Platelets	Normal (N=98) Abnormal (N=0)	t(*p*-value)	–	–	–
MCV	Normal (N=86) Abnormal (N=12)	t(*p*-value)	0.298 (0.767)	1.578 (0.118)	1.420 (0.159)
MCH	Normal (N=84) Abnormal (N=14)	t(*p*-value)	0.864 (0.390)	0.181 (0.857)	0.114 (0.909)
MCHC	Normal (N=57) Abnormal (N=41)	t(*p*-value)	−1.234 (0.220)	−0.601 (0.549)	−0.087 (0.931)
RDW	Normal (N=97) Abnormal (N=1)	t(*p*-value)	–	–	–
PDW	Normal (N=98) Abnormal (N=0)	t(*p*-value)	–	–	–
PCT	Normal (N=77) Abnormal (N=21)	t(*p*-value)	0.073 (0.942)	0.448 (0.655)	−0.537 (0.593)
MPV	Normal (N=61) Abnormal (N=37)	t(*p*-value)	−0.638 (0.525)	−0.966 (0.336)	−0.147 (0.640)

* Statistical significance was evaluated using an independent sample *t*-test.
† * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

3. Clinical analysis of therapeutic variation

1) The number of treatments in Korean Medical Hospital

The number of treatments in a Korean medical hospital (sum of inpatient and outpatient) in relation to the HB scale grade following treatment, and after 12 months, was analyzed through simple regression analysis. According to the analysis, the number of treatments at a Korean medical hospital showed no statistical significance with the HB scale after 12 months ($p>0.05$), but showed statistical significance with the HB scale following treatment ($p<0.05$) (Table 18). Patients who were treated in a Korean medical hospital demonstrated early recovery.

2) Total number of treatments for Facial palsy

Simple regression analysis was used to identify the relationship between the total number of treatments (sum of the number of treatment in a Korean medical hospital and the number of treatments in other hospitals within 12 months) and the HB scale that following treatment and after 12

Table 17. The UA factors effect on facial palsy*

			Initial HB scale	Following Treatment HB scale	After 12 months HB scale
Protein	Normal (N=92) Abnormal (N=6)	t(*p*-value)†	-0.383 (0.702)	-1.164 (0.247)	-0.597 (0.552)
S.G	Normal (N=91) Abnormal (N=7)	t(*p*-value)	0.039 (0.969)	-0.222 (0.825)	-1.014 (0.313)
P.H	Normal (N=98) Abnormal (N=0)	t(*p*-value)	-	-	-
Leukocyte	Normal (N=86) Abnormal (N=12)	t(*p*-value)	0.728 (0.468)	-0.882 (0.380)	0.552 (0.582)
Nitrite	Normal (N=97) Abnormal (N=1)	t(*p*-value)	-	-	-
Glucose	Normal (N=78) Abnormal (N=20)	t(*p*-value)	0.171 (0.865)	0.130 (0.897)	-0.954 (0.343)
Urobilinogen	Normal (N=96) Abnormal (N=2)	t(*p*-value)	-	-	-
Ketone	Normal (N=84) Abnormal (N=14)	t(*p*-value)	0.460 (0.647)	0.946 (0.346)	0.918 (0.361)
Bilirubin	Normal (N=96) Abnormal (N=2)	t(*p*-value)	-	-	-
Blood	Normal (N=86) Abnormal (N=12)	t(*p*-value)	-0.131 (0.896)	-2.001 (0.048)	-1.752 (0.083)
RBC	Normal (N=84) Abnormal (N=14)	t(*p*-value)	0.057 (0.954)	0.181 (0.857)	1.189 (0.237)
WBC	Normal (N=85) Abnormal (N=13)	t(*p*-value)	0.589 (0.557)	0.061 (0.951)	0.188 (0.851)
Epithelial	Normal (N=76) Abnormal (N=22)	t(*p*-value)	0.316 (0.752)	0.117 (0.907)	-0.776 (0.440)

* Statistical significance was evaluated using an independent sample *t*-test.
† ** $p<0.05$, *** $p<0.01$.

Table 18. The number of treatments in a Korean medical hospital effects on Bell's palsy patients*

		Non-standardized		Standardized	F(*p*-value)†
		Constant	SD	beta	
Following Treatment HB scale	Model	3.920(0.000)***	0.208		6.277 (0.014)**
	Treatment number	-0.022(0.014)**	0.009	-0.248	
After 12 months HB scale	Model	1.937(0.000)***	0.023		1.253 (0.266)
	Treatment number	-0.010(0.266)	0.009	-0.114	

* Statistical significance was evaluated using simple regression.
† ** $p<0.05$, *** $p<0.01$.

months. The total number of treatments within one year had no statistical significance with the initial HB scale and after 12 months ($p>0.05$) (Table 19).

Table 19. The total number of treatment effects on Bell's palsy patients*

		Non-standardized		Standardized	F(*p*-value)†
		Constant	SD	beta	
Initial HB scale	Model	4.539(0.000)***	0.126		3.150 (0.079)
	Treatment number	0.007(0.079)	0.004	0.178	
After 12 months HB scale	Model	1.662(0.000)***	0.193		0.268 (0.606)
	Treatment number	0.003(0.606)	0.006	0.053	

* Statistical significance was evaluated using simple regression.
† ** $p<0.05$, *** $p<0.01$.

Ⅳ. Discussion

Idiopathic facial palsy, also known as Bell's palsy, is the most common type of facial nerve paralysis Bell's palsy can occur at any age[8], with a prevalence in pregnant women[9], and in those with diabetes mellitus, hypertension, and a history of Bell's palsy[10,11]. However, according to a study of Ahn et al[12], age, sex, post-auricular pain, and the initial HB grade were statistically significant, while the palsy affected side of the face, a history of facial palsy, the presence of diabetes mellitus and hypertension were shown to have no statistical significance. In a study of Min et al[13], sex, age, post-auricular pain, and the time from onset, the presence of diabetes mellitus and hypertension, and a history of facial palsy did not show statistical significance, while the palsy-affected side of the face, the initial degree of palsy severity, the time of initial recovery, and recovery in three weeks from onset, showed statistical significance. There have been few studies on the prognosis and related factors in respect of facial palsy, with differing results.

This study identified the statistical significance of factors related to the prognosis of facial palsy, and aimed to provide further information for ongoing research on the prognosis and treatment of facial palsy patients. This study was conducted on 98 facial palsy patients who were hospitalized in a Korean medical hospital from January 1, 2015 to December 31, 2015. Patients with facial palsy were followed up retrospectively at the initial, following treatment, and after 12 months. A statistical analysis was performed to confirm the association of facial palsy recovery with various factors related to facial palsy. To minimize statistical error, this study only included facial palsy patients who were admitted to the hospital within one week from the onset of the illness and who were prescribed steroids. The medical data were divided into three categories: data related to patient characteristics, data related to medical examinations, and data related to the number of treatments

Concerning patient characteristics, sex, age, the palsy-affected side of the face, alcohol consumption, smoking, a history of Bell's palsy and the season of onset were not statistically significant with the initial HB grade, following treatment, and after 12 months. Sex, the palsy-affected side of the face, alcohol consumption, smoking, a history of Bell's palsy, and the season of onset were not significant as factors for the occurrence and prognosis of Bell's palsy.

Age had a statistical significance with the initial HB grade, following treatment, and after 12 months. According Duncan's post-hoc analysis, initial HB grade and following treatment showed a statistical difference in the 0-29 year old group and in the 70-79 year old group. It appears that

the older the patient, the more severe the initial degree of facial palsy. Furthermore, the older the patient, the more difficult it is for recovery. According to Duncan's post-hoc analysis, the HB grade after 12 months, the 0-29 year old, 30-39 year old, and 40-49 year old showed similar recovery rates, while the groups older than 50 years showing slowed recovery rates.

Patients with a history of hypertension had a high initial average HB grade leading to severe initial degree, but it did not have statistical significance. However, there was a statistically significant difference with the HB grade following treatment and after 12 months. The mean value of the HB grade was higher than those without a history of hypertension. Also, patients with a history of diabetes mellitus had a high initial HB grade tending toward severity, with no statistical significance. The average of the HB grades following treatment was also high, which was not statistically significant. However, the HB grade after 12 months was statistically significant, and the average of HB scale grades was higher than those without a history of diabetes mellitus, which shows that a past history of diabetes mellitus slows the recovery of facial palsy. Therefore, patients with hypertension and diabetes mellitus have slower rates of recovery from facial palsy and a high possibility of having sequela.

HB grade at initial and after 12 months showed statistical significance with initial HB grade, and the higher the initial HB grade, the slower the recovery from facial palsy.

Except for FBS, none of blood and urine test factors was statistically significant with the prognosis of facial palsy. As with a history of diabetes mellitus, a FBS also had a negative effect on the prognosis of facial palsy. There were 55 patients who had FBS abnormality. In contrast, 17 patients were diagnosed with diabetes mellitus. The FBS can be tested easily, so it is possible to identify those who are unaware of possible diabetes mellitus, and it is more useful as a prognostic factor than a history of diabetes mellitus. However, there was no statistical significance between urinary sugar and facial palsy prognosis. This may result from the fact that glucose can be detected in urine for reasons other than renal dysfunction due to diabetes mellitus. Therefore, urinary sugar has a limited significance in relation to the prognosis of facial palsy, which calls for further studies.

In relation to the number of treatments and the prognosis of facial palsy, the greater the number of treatments at a Korean medical hospital, the more improvement in HB grade following treatment, which was statistically significant. This result shows that treatment at a Korean medical hospital leads to faster recovery. This is consistent with a study of Won et al[20] that more treatment sessions positively affect recovery.

The total number of treatments for one year was not statistically significant with the initial HB grade and following treatment. In conclusion, recovery from facial palsy is dependent on personal characteristics such as age, the initial degree of palsy severity, hypertension, and diabetes mellitus.

As noted, age, hypertension, diabetes mellitus, FBS, and initial degree of palsy were statistically significant with prognosis of facial palsy. The study of Ahn et al[18] and Min et al[19], also found that, the initial degree of palsy severity was significant with the prognosis of facial palsy, and this finding was consistent with the conclusion in the study of Won et al[20]. However, the results of this study differ from previous studies undertaken in Korea[18-21] that a history of diabetes mellitus and hypertension is not significant in the prognosis of facial palsy. However, the results of this study showing that hypertension, diabetes mellitus are statistically significant with the prognosis of facial palsy are consistent with studies from other countries[16,17]. Further research is needed on this matter.

Although there have been several studies on the prognostic factors of facial palsy, the different results come from using different criteria on facial palsy patients. Although this study was conducted on idiopathic facial palsy, other studies may well have included viral facial palsy or facial palsy due

to other causes. Furthermore, prognostic factors for facial palsy investigated for each study also varied. There were differences in the total number of treatments each patient received during recovery, and also differences in treatment strategies within traditional Korean medicine, which is not strictly controlled condition. In future, studies should be conducted with a systematic design that controls for these factors.

This study differs from other studies that have followed up patients for one to three months, because the condition of patient was investigated after 12 months retrospectively. Another difference is the inclusion of an aim for finding an objective prognostic factor for facial palsy, such as blood or urine test. However, a relatively small sample size of 98 and an individualized treatment strategy for each patient made the study design less controlled, such as variations in acupuncture treatment and in herbal prescriptions. Also, evaluation using the HB grading system influenced by the researcher's subjective decisions, and the condition of the patient after 12 months was evaluated through a telephone survey. Further studies with an improved design should be conducted.

V. Conclusion

This study investigated 98 patients diagnosed as having Bell's palsy and who were admitted to a Korean medical hospital in 2015. This study statistically analyzed clinical data, such as patient characteristics, clinical laboratory test data, and the total number of treatments to identify the relationship with prognostic factors for Bell's palsy. The following results were obtained :

1. The initial degree of Bell's palsy had statistical significance with age. Older age was related to a more severe initial degree of Bell's palsy.
2. The degree of Bell's palsy following treatment had statistical significance with age, hypertension, FBS, and the number of treatments in a Korean medical hospital. Older patients tended to recover more slowly. Patients with hypertension and FBS showed slower recovery than patients without hypertension and FBS. Patients who received more sessions of treatment in a Korean medical hospital tended to show faster early recovery.
3. The degree of Bell's palsy after 12 months was statistically significant with age, hypertension, diabetes mellitus, FBS, and the initial degree of Bell's palsy severity. The 0–29, 30–39, 40–49 year old groups showed similar recovery rates, but patients in the older age groups of more than 50 years showed slower recovery rates. Patients with hypertension, diabetes mellitus and FBS showed slow recovery. A severe initial degree of Bell's palsy resulted in difficulties in attaining complete recover after 12 months.

VI. References

1. Lee HY, Ryu EW, Park SW, Kim SJ, Yeo SG, Park MS. Analysis of associated symptoms of Bell's palsy. Kerean J Otorhinolaryngol-Head Neck Surg. 2011;54(10):683-7.
2. McCaul JA, Cascarini L, Godden D, Coombes D, Brennan PA, Kerawala CJ. Evidence bases management of Bell's palsy. Br J Oral Maxillofac Surg. 2014;52(5):387-91.
3. Baugh RF, Basura Gj, Ishii LE et al. Clinical practice guidelines: Bell's palsy. Otolayngol Head Neck Surg. 2013;149(3):1-27.
4. Hohman MH, Hadlock TA. Etiology, diagnosis, and management of facial palsy: 2000 patients at a facial nerve center. Laryngoscope. 2014; 124(7):283-93.
5. Kwon NH, Shin YJ, Kim CY et al. Comparative Clinical Study between Korean Medicin

Medical and Korean Medicin-Western Medical Treatment on Bell's Palsy. The Acupunct. 2008;25(3):19-28.
6. Kwon SJ, Kim GH, Song HS. The Influence of Moxibustion and Basic Compound Therapy on Peripheral Facial Paralysis. The Acupunct. 2000;17(4):160-71.
7. An BJ, Song HS. Effect of Electroacupuncture on Patients with Peripheral Facial Paralysis. The Acupunct. 2005;22(4):121-9.
8. Patel DK, Levin KH. Bell palsy: Clinical examination and management. Cleve Clin J med. 2015;82(7):419-26.
9. Gronseth GS, Paduga R. Evidence-based guide line update: steroids and antivirals for Bell's palsy: report of the Guideline Development Subcommittee of the American Academy of Neurology. Neurology. 2012;79(22):2209-13.
10. Park IB, Kim SW, Lee CW et al. Comparative Clinical Study between Korean Medicin Medicine and Korean Medicin-Western Medicine Treatment on Bells palsy. The Acupunct. 2004;21(5):191-203.
11. Morris AM, Deeks SL, Hill MD et al. Annualized incidence and spectrum of illness from an outbreak investigation of Bell's palsy. Neuroepidemiology. 2002;21(5):255-61.
12. Peitersen E. Bell's palsy: The spontaneous course of 2,500 peripheral facial nerve palsies of different etiologids. Acta Otalayngol Suppl. 2002;(549):4-30.
13. Sung WS, Kim PK, Goo BH et al. Study on the Validity of Electromyography(EMG) And Early-performed Electroneurography(ENoG) as Predicting Factor for Facial Palsy - based on Collaborative Treatment between Korean and Western Medicine. The Acupunct. 2013;30(4):115-23.
14. Kim CY, Kim JI, Lee SH, Park DS, Koh HK. A Study of Correlation between Electromyography(EMG) and the Heart Rate Variability(HRV) Test, and Their Role as Predicting Factors for Peripheral Facial Palsy Prognosis. The Acupunct. 2008;25(2):189-97.
15. Holland NJ, Weiner GM. Recent developments in Bell's palsy. BMJ. 2004;329(7465):553-7.
16. Adour K, Wingerd J, Doty HE. Prevalence of concurrent diabetes mellitus and idiopathic facial paraysis. Diabetes. 1975;24(5):449-51.
17. Cai Z, Li H, Wang X et al. Prognostic factors of Bell's palsy and Ramsay Hunt syndrome. Medicine (Baltimore). 2017;96(2):e5898.
18. Ahn CB, Yoon HM, Jang KJ et al. An Analysis of Clinical Prognosis Factors of Peripheral Facial Palsy and the Effects of Electrodiagnosis. The Acupunct. 2007;24(4):209-23.
19. Min YG, Ahn CB, Jang KJ et al. An Analysis of Clinical Prognosis Factors of Bell's Palsy. The Acupunct. 2008;25(3):209-23.
20. Won JS, Chou CY, Cho AR, Kim JH, Kim CH. The Clinical observation of acute Bell's palsy 80 Case. JKOOD. 2010;23(2):151-62.
21. Cho HC. Clinical Analysis of Prognostic Factors [dissertation]. Gwangju: Chonnam National Univ. 2007. Korean.