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Original Article

Yin-Yang Harmony Acupuncture Therapy improves facial motor function and resting state facial appearance in peripheral facial paralysis

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Abstract: Objectives: Peripheral facial paralysis, also known as Bell's palsy, is characterized by acute dysfunction of the facial nerve. Standard treatments like corticosteroids and antiviral agents don't always lead to full recovery. This study aimed to evaluate the efficacy of Yin-Yang Harmony Acupuncture Therapy (YYHAT) in improving facial muscle function and resting state facial appearance in affected patients. Methods: A retrospective analysis was conducted on 202 patients with peripheral facial paralysis who received either conventional acupuncture or YYHAT in conjunction with standard medical treatments. Clinical outcomes were assessed using surface electromyography (sEMG) for muscle latency and amplitude, facial vascular hemodynamics (via Doppler ultrasound), modified Portmann scores, anxiety and depression scales, and patient satisfaction. Results: Compared to the conventional group, the YYHAT group demonstrated significantly better improvements in sEMG latency and amplitude for key facial muscles ($P < 0.05$). Doppler ultrasound revealed increased diastolic end velocity and systolic peak velocity of the facial artery in the YYHAT group ($P < 0.05$). The YYHAT group also achieved better modified Portmann scores in both facial motor function and resting state appearance. Additionally, patients in the YYHAT group showed greater reductions in anxiety and depression symptoms ($P < 0.05$) and higher satisfaction with treatment efficacy ($P = 0.02$). Conclusion: Yin-Yang Harmony Acupuncture Therapy significantly enhances both physiological and psychological recovery in patients with peripheral facial paralysis compared to conventional acupuncture.

Keywords: Peripheral facial paralysis, Yin-Yang Harmony Acupuncture, electromyography, facial hemodynamics, patient satisfaction, anxiety and depression

Introduction

Peripheral facial paralysis, commonly referred to as Bell's palsy, is characterized by the sudden onset of unilateral facial weakness or paralysis due to dysfunction of the facial nerve (cranial nerve VII), and it can result in profound functional impairment and psychosocial distress [1]. Clinical manifestations include facial muscle weakness, asymmetry, and compromised facial expressions, which can affect communication and self-esteem [2]. Although many patients experience spontaneous recovery, a considerable proportion suffer from persistent facial dysfunction, necessitating effective therapeutic interventions to enhance recovery and prevent long-term sequelae [3].

Standard treatment includes corticosteroids and antiviral agents, particularly in cases with a presumed viral etiology [4]. However, a subset of patients fail to achieve full functional recovery despite this approach. Consequently, increasing attention has been paid to complementary therapies such as acupuncture [5]. As a key component of Traditional Chinese Medicine (TCM), acupuncture has been practiced in Asia for thousands of years had has gained increasing acceptance in Western countries for managing pain and various neurological disorders [6].

Emerging evidence suggests that acupuncture may benefit patients with peripheral facial paralysis through mechanisms such as enhancing microcirculation, reducing inflammation, modulating neurotrophic factors, and promoting neural plasticity [7]. These effects may collectively support nerve regeneration and restore muscle function. Traditional acupuncture

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involves stimulation of specific acupoints for restoring the balance of "Qi" (vital energy), a concept increasingly correlated with specific neuroanatomical and vascular structures in modern research [8].

Yin-Yang Harmony Acupuncture Therapy (YYHAT) is a refined acupuncture approach grounded in the principles of TCM, specifically the dynamic balance between Yin and Yang. These two are fundamental, opposing yet complementary forces central to TCM theory [9]. This approach aims to restore systemic equilibrium and promote both local and global physiological regulation by selecting specific acupoints based on individualized syndrome differentiation [10]. In the context of peripheral facial paralysis, YYHAT may offer distinct advantages by targeting pathways involved in nerve regeneration, muscle reinnervation, and microvascular circulation.

Despite its theoretical advantages, the clinical efficacy of YYHAT in treating peripheral facial paralysis remains insufficiently studied. Existing studies have predominantly focused on conventional acupuncture, with limited exploration of advanced or specialized techniques such as YYHAT. To bridge this gap, the present study investigated the therapeutic effects of YYHAT on facial muscle function and resting state facial scores in patients with peripheral facial paralysis.

Research methods

Case selection

A retrospective analysis was conducted on 202 patients diagnosed with peripheral facial paralysis at the Affiliated Hospital of Jiangnan University between January 2018 and January 2024. Based on their treatment modalities, the patients were divided into two groups: a conventional acupuncture group (n = 100) and a YYHAT group (n = 102). This study was approved by the Institutional Review Board and Ethics Committee of the Affiliated Hospital of Jiangnan University.

Inclusion criteria: (1) diagnosis of peripheral facial paralysis according to the *Guidelines for the Diagnosis and Treatment of Peripheral Facial Paralysis with Integrated Chinese and Western Medicine* [11]; (2) age ≥ 18 years; (3) receipt of either standard acupuncture treatment or Yin-Yang harmonizing acupuncture; (4) disease duration ≤ 2 weeks; (5) unilateral facial paralysis [2]; (6) complete clinical records and comprehensive case information; and (7) completion of a three-month follow-up.

Exclusion criteria: (1) confirmed diagnosis of malignancy; (2) presence of neuropsychiatric disorders or cognitive impairment; (3) refractory peripheral facial paralysis secondary to conditions such as craniocerebral injury [12]; (4) pregnancy or lactation; (5) hemorrhagic disorders, such as hemophilia or coagulation dysfunction; or (6) severe cardiovascular or cerebrovascular diseases.

Treatment protocols

Both patient groups received identical Western medical treatment regimen. Acyclovir tablets (Yunnan Haobang Pharmaceutical Co., Ltd.; approval number: H53020156; specification: 0.1 g) were administered at a dose of 0.2 g, three times daily for two weeks. Prednisone acetate tablets (Anhui Jinyangsun Biochemical Pharmaceutical Co., Ltd.; approval number: H34021846; specification: 5 mg) were prescribed at 10 mg, three times daily for five days. Starting on day six, the dose was gradually reduced by 10 mg every two days, reaching 5 mg on day 10, followed by discontinuation. Mecobalamin tablets (Eisai China Inc., approval number: H20143107; specification: 0.5 mg) were given at 0.5 mg, three times daily for two weeks. Vitamin B1 tablets (Tianjin Lisheng Pharmaceutical Co., Ltd.; approval number: H12020168; specification: 10 mg) were administered at 10 mg, three times daily for two weeks [13].

Patients in the conventional acupuncture group underwent standard acupuncture treatment. Local acupoints on the affected side included Yangbai, Fengchi, Xiaguan, Yifeng, Sibai, Jiache, Cuanzhu, and Dicang, while distal acupoints included Hegu and Zusanli (bilaterally). For local acupoints, Yangbai was needled perpendicularly along the frontal plane at an angle of approximately 10°, to a depth of 0.5-1 inch, and retained for 20 minutes; Fengchi was needled from the posterior aspect, directed inward and downward towards the philtrum or nasal tip at a 45° angle relative to the sagittal plane, to a depth of 0.3-1.1 inches, retained for 20 minutes; Xiaguan and Yifeng were needled perpendicularly and slightly downward to a depth of

1.5 inches, with needles retained for 20 minutes; Sibai was needled obliquely upward to a depth of 0.2-0.3 inches, retained for 20 minutes; Jiache was needled from the posterior aspect towards the mouth corner, to a depth of 2-3 inches, retained for 20 minutes; Cuanzhu was obliquely needled downward through Jingming, to a depth of 0.3-0.5 inches, retained for 20 minutes; Dicang was needled through to Jiache, to a depth of 1.5-2.5 inches, retained for 20 minutes. For distal acupoints (bilateral), Hegu was needled obliquely toward the second metacarpal bone at an 80° angle relative to the dorsum of the hand, to a depth of 0.3-0.5 inches, retained for 20 minutes; Zusanli was needled horizontally at a 90° angle to the lateral aspect of the lower leg, to a depth of 0.6-1.2 inches, retained for 20 minutes. Treatment frequency was once every two days, with a total of 10 sessions per course.

In addition to the conventional acupuncture protocol, patients in the YYHAT group received stimulation of two additional acupoints on the affected side: Shuigou and Chengjiang. Shuigou was needled either obliquely upward or perpendicularly to a depth of 0.2-0.3 inches, retained for 20 minutes, followed by moxibustion with 3-5 moxa cones. Chengjiang was needled obliquely to a depth of 0.3-0.5 inches, retained for 20 minutes, and subsequently treated with mild moxibustion for 5-10 minutes. The treatment frequency was once every two days, for a total of 10 sessions per course, consistent with the conventional acupuncture group.

Data collection

Data were extracted from patients' medical records, encompassing demographic characteristics, pre- and post-treatment surface electromyography (sEMG) results, facial ultrasound findings, modified Portmann scores, modified House-Brackmann (H-B) scores, and Facial Disability Index Scores (FDIS). Additionally, data on treatment efficacy, psychological status, and patient satisfaction were collated.

Demographic and Clinical Characteristics: Demographic Characteristics included age, body mass index (BMI), gender, smoking and drinking history, and the presence of conditions such as hypertension and diabetes. Additionally, sociodemographic factors such as marital status, educational level, ethnicity, disease duration, lesion location, degree of facial nerve paralysis, and disease progression were documented.

Degree of Facial Nerve Paralysis: The degree of facial nerve paralysis was categorized into six levels based on established criteria [14].

Level I (Normal): Symmetrical and normal facial movements.

Level II (Mild Dysfunction): Mild weakness with slight asymmetry during maximum voluntary movement; no significant asymmetry at rest; Normal or near-normal eye closure and smiling.

Level III (Moderate Dysfunction): Moderate weakness with obvious facial asymmetry. The eyes can be closed completely, and the corners of the mouth move, though without full symmetry. Mild asymmetry was noticeable at rest.

Level IV (Moderately Severe Dysfunction): Marked weakness. Incomplete eye closure and reduced, asymmetric mouth movement. Pronounced asymmetry of the lower face is evident at rest.

Level V (Severe Dysfunction): Minimal facial movements. Eye closure is incomplete, and movement at the corners of the mouth is barely perceptible. Resting facial asymmetry is severe.

Level VI (Total Paralysis): Complete loss of voluntary facial movement with an inability to close the eyes or exhibit any spontaneous or voluntary facial movements. The face was completely asymmetric when at rest [15].

Modified Portmann Scores: The modified Portmann scores [8] was used to evaluate facial function, comprising facial motor function and facial resting state.

Facial motor function (6 items) include bulging cheeks, eye closure, eyebrow elevation, lip pursing, nostril dilation, and teeth exposure. Each item was scored on a 4-point scale from 0 to 3: 0 points indicate a loss of facial motor function, 1 point signifies a significant reduction in function, 2 points denote mild reduction, and 3 points represent normal function.

Facial resting state was assessed on a 3-point scale from 0 to 2: 0 points correspond to severe facial asymmetry at rest, 1 point corresponds to slight asymmetry, and 2 points for normal appearance at rest.

A higher score reflects better facial function [3, 16].

Outcome measurements

Surface Electromyography (sEMG) of facial muscles: sEMG assessments of the facial muscles were conducted for both groups before and three weeks after treatment. A full-feature electromyographic evoked potential instrument (KEYPOINT, Guangzhou Weidi Medical Equipment Co., Ltd., China) was used for data acquisition. Electrodes were placed on the skin over the frontalis, orbicularis oculi, and orbicularis oris muscles. The stimulating electrode was positioned over the stylomastoid foramen. The stimulation intensity gradually increased from a low level until a maximum and stable waveform was achieved. The primary parameters measured included latency and amplitude of muscle electrical activity. Each parameter was measured three times, and the average value was used for statistical analysis [3].

Facial vascular ultrasound: Facial ultrasound examinations were performed on all patients using a color Doppler ultrasound diagnostic device (Acuson S2000, Siemens, Germany) before treatment and three weeks post-treatment. Patients were positioned supine, and the facial artery was identified. Key hemodynamic indicators of the facial artery were measured, including end diastolic velocity (EDV), systolic peak velocity (Vs), and resistance index (RI). The Resistance Index was calculated using the formula: RI = (Vs-EDV)/Vs [17].

Therapeutic effect: After three weeks of treatment, therapeutic efficacy was evaluated based on the modified Portmann score, calculated as the sum of the facial motor function score and facial resting state score [14]. Treatment efficacy were categorized into clinical recovery (total score of 20), markedly effective (total score of 17-19), effective (total score of 14-16), and effective (total score < 14) [15].

Psychological status: The Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS) were utilized for psychological assessment [18]. The SAS comprises 20 items, each rated on a 4-point Likert scale: 1 (none or a little of the time), 2 (sometimes), 3 (often), and 4 (most or all the time). The raw score was converted to a standard score by multiplying by 1.25 and rounding down to the nearest integer. Severity was classified as follows: normal (< 50), mild anxiety (50-59), moderate anxiety (60-69), and severe anxiety (≥ 70) [19].

The SDS also consists of 20 items, each evaluated on a 4-point Likert scale: 1 (none or a little of the time), 2 (sometimes), 3 (often), and 4 (most or all the time). The total score was likewise multiplied 1.25 and rounded down to obtain the standard score. Severity categories were defined as: normal (< 53), mild depression (53-62), moderate depression (63-72), and severe depression (≥ 73) [20].

Satisfaction: Patients' satisfaction with the treatment was assessed using a hospital-developed questionnaire, covering the subjective treatment effects experienced by patients, the professionalism of the medical staff, and their attitudes. The scoring system was as follows: very satisfied (4-6 points), average (2-4 points), and dissatisfied (0-2 points).

Statistical analysis

Data analysis was performed utilizing SPSS 29.0 (SPSS Inc., Chicago, IL, USA). Categorical variables were expressed as frequencies and percentages [n (%)], with comparisons made using the chi-square test. For continuous data following a normal distribution (Shapiro-Wilk test), values were reported as means ± standard deviations (X ± s) and compared by student t-test or paired t test. A *P*-value < 0.05 was considered statistically significant.

Results

Baseline characteristics of participants

Baseline characteristics were comparable between the two groups in terms of age (P = 0.205), BMI (P = 0.871), gender distribution (P = 0.791), smoking history (P = 0.483), alcohol consumption history (P = 0.616), hypertension (P = 0.833), diabetes (P = 0.616), marital status (P = 0.807), educational level (P = 0.489), ethnicity (P = 0.357), course of disease (P = 0.569), lesion location (P = 0.370), degree of facial nerve paralysis (P = 0.949), disease progression (P = 0.967), facial motor function score (P = 0.412), and facial resting state score (P = 0.888) (**Table 1**). These results indicate that both groups were well-matched at baseline, supporting the validity of subsequent comparisons regarding the efficacy of YYHAT.

Table 1. Comparison of baseline characteristic between the two groups

Parameters	Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	t/χ^2	P
Age (years)	45.3 ± 5.23	44.4 ± 4.58	1.271	0.205
Body Mass Index (kg/m^2)	23.18 ± 1.59	23.22 ± 2.07	0.163	0.871
Female/Male	56 (56.00%)/44 (44.00%)	59 (57.84%)/43 (42.16%)	0.070	0.791
Smoking history (Yes/No)	34 (34.00%)/66 (66.00%)	30 (29.41%)/72 (70.59%)	0.491	0.483
Alcohol consumption history (Yes/No)	31 (31.00%)/69 (69.00%)	35 (34.31%)/67 (65.69%)	0.252	0.616
Hypertension (Yes/No)	8 (8.00%)/92 (92.00%)	9 (8.82%)/93 (91.18%)	0.044	0.833
Diabetes (Yes/No)	12 (12.00%)/88 (88.00%)	10 (9.80%)/92 (90.20%)	0.251	0.616
Marital Status (Married/Unmarried)	74 (74.00%)/26 (26.00%)	77 (75.49%)/25 (24.51%)	0.059	0.807
Educational level (Junior college graduate or lower/College graduate or higher)	47 (47.00%)/53 (53.00%)	43 (42.16%)/59 (57.84%)	0.479	0.489
Ethnicity (Han/Other)	86 (86.00%)/14 (14.00%)	92 (90.20%)/10 (9.80%)	0.849	0.357
Course of disease			0.324	0.569
≤ 7 (days)	46 (46.00%)	51 (50.00%)		
7-14 (days)	54 (54.00%)	51 (50.00%)		
Location of lesion			0.804	0.370
Right	64 (64.00%)	59 (57.84%)		
Left	36 (36.00%)	43 (42.16%)		
Degree of facial nerve paralysis			0.106	0.949
II	17 (17.00%)	16 (15.69%)		
III	61 (61.00%)	62 (60.78%)		
IV	22 (22.00%)	24 (23.53%)		
Disease progression			0.002	0.967
Sudden onset	92 (92.00%)	94 (92.16%)		
Progressive type	8 (8.00%)	8 (7.84%)		
Facial motor function			1.775	0.412
0-6	54 (54.00%)	48 (47.06%)		
7-12	36 (36.00%)	46 (45.10%)		
13-18	10 (10.00%)	8 (7.84%)		
Resting state appearance			0.238	0.888
0	38 (38.00%)	40 (39.22%)		
1	49 (49.00%)	51 (50.00%)		
2	13 (13.00%)	11 (10.78%)		

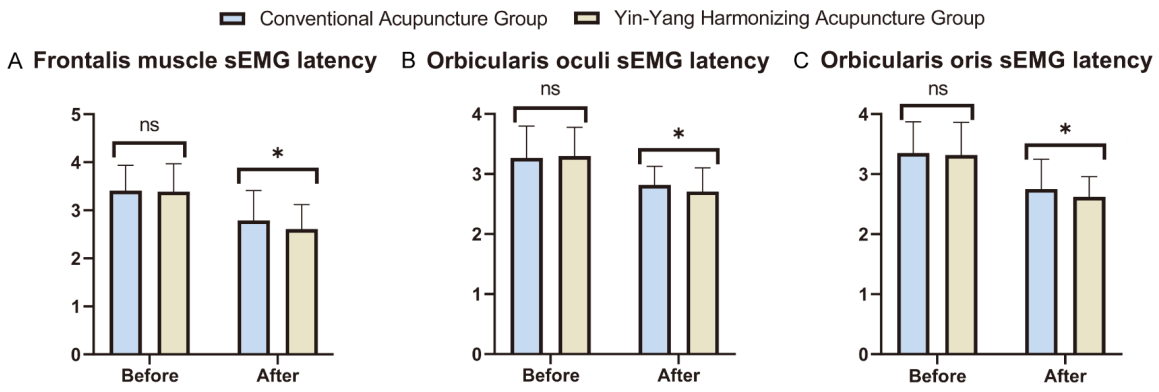

Figure 1. Comparison of facial muscle sEMG latency between the two groups before and after treatment. A: Frontalis muscle sEMG latency; B: Orbicularis oculi sEMG latency; C: Orbicularis oris sEMG latency. ns: no significant difference, *$P < 0.05$.

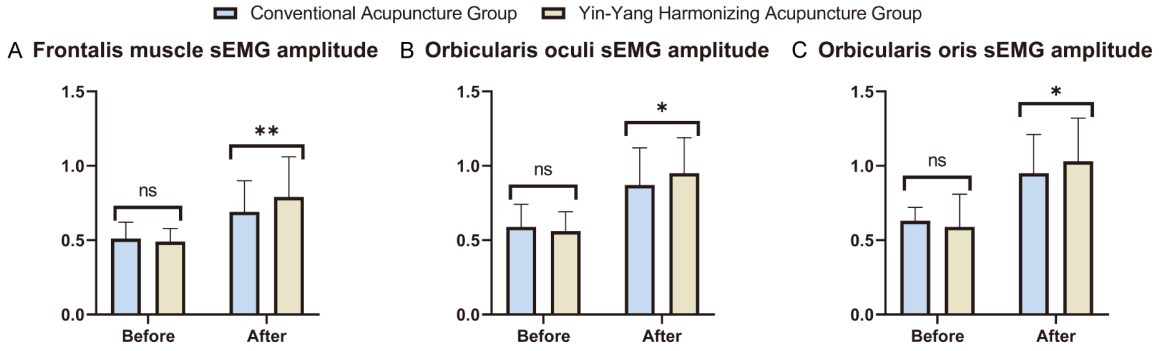

Figure 2. Comparison of facial muscle sEMG amplitude between the two groups before and after treatment. A: Frontalis muscle sEMG amplitude; B: Orbicularis oculi sEMG amplitude; C: Orbicularis oris sEMG amplitude. ns: no significant difference, *$P < 0.05$, **$P < 0.01$.

Facial muscle sEMG latency

Before treatment, there were no significant differences in sEMG latency between the two groups in terms of the frontalis (P = 0.805), orbicularis oculi (P = 0.665), or orbicularis oris muscles (P = 0.636) (**Figure 1**). After treatment, significantly greater improvements were observed in the YYHAT group compared to the conventional group: frontalis muscle latency (P = 0.027), orbicularis oculi latency (P = 0.031), and orbicularis oris latency (P = 0.043). These results suggest that YYHAT was more effective in enhancing facial muscle responsiveness in patients with peripheral facial paralysis compared to conventional acupuncture.

Facial muscle sEMG amplitude

Prior to treatment, no significant differences in facial muscle sEMG amplitude were observed between the two groups for the frontalis (P = 0.072), orbicularis oculi (P = 0.091), or orbicularis oris muscles (P = 0.128) (**Figure 2**). Following treatment, the YYHAT group showed significantly greater improvements in sEMG amplitude compared to the Conventional Group (frontalis muscle: P = 0.005; orbicularis oculi: P = 0.014; and orbicularis oris: P = 0.046). These findings highlight that YYHAT was more effective than conventional acupuncture in enhancing facial muscle excitability as reflected by increased sEMG amplitude.

Facial artery hemodynamic parameters on the affected side

Before treatment, there were no significant differences in EDV (P = 0.468), Vs (P = 0.579), or RI (P = 0.141) between the two groups (**Table 2**). After treatment, both groups showed significant improvements compared to their pre-treatment status (P < 0.05). However, the YYHAT group demonstrated more significant improvements in EDV (P = 0.044) and Vs (P = 0.019) compared to the conventional acupunc-

Table 2. Comparison of EDV, Vs, and RI between the two groups before and after treatment

Parameters		Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	t	P
EDV (cm/s)	Before Treatment	7.64 ± 1.23	7.49 ± 1.59	0.728	0.468
	After Treatment	14.75 ± 2.25*	15.62 ± 3.68*	2.025	0.044
Vs (cm/s)	Before Treatment	43.79 ± 6.31	43.27 ± 6.89	0.555	0.579
	After Treatment	59.16 ± 6.77*	61.38 ± 6.57*	2.371	0.019
RI	Before Treatment	0.85 ± 0.26	0.89 ± 0.20	1.477	0.141
	After Treatment	0.66 ± 0.12*	0.68 ± 0.18*	0.932	0.353

EDV: End Diastolic Velocity; Vs: Systolic Peak Velocity; RI: Resistance Index. *: before treatment vs after treatment, P < 0.05.

Table 3. Comparison of Portmann score between the two groups

Parameters	Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	χ^2	P
Facial motor function			6.350	0.042
0-6	18 (18.00%)	7 (6.86%)		
7-12	24 (24.00%)	23 (22.55%)		
13-18	58 (58.00%)	72 (70.59%)		
Resting state facial appearance			9.453	0.009
0	23 (23.00%)	11 (10.78%)		
1	39 (39.00%)	32 (31.37%)		
2	38 (38.00%)	59 (57.84%)		

ture group. No significant difference was found in post-treatment RI values between the two groups (P = 0.353). These results suggest that YYHAT more effectively promotes microvascular perfusion, as reflected by increased facial artery blood flow velocities, while exerting no significant effect on vascular resistance.

Modified Portmann score

For facial motor function, the YYHAT group showed significantly greater improvement than the conventional acupuncture group (P = 0.042), with a larger proportion of patients achieving scores in the 13-18 range, and fewer falling into the 0-6 range (**Table 3**). Regarding the facial resting state, the YYHAT group also demonstrated superior outcomes (P = 0.009), with a greater proportion of patients scoring 2, indicating better symmetry and muscle tone at rest. These findings suggest that YYHAT is more effective in enhancing both active facial motor functions and resting facial appearance in patients with peripheral facial paralysis.

Therapeutic effect

Comparative analysis of overall therapeutic efficacy revealed significant differences between the two groups (P = 0.007) (**Table 4**). The YYHAT group exhibited a higher rate of clinical recovery and a lower rate of ineffective cases compared to the conventional group. These results indicate that YYHAT is more effective in achieving clinical recovery and reducing ineffective treatment outcomes compared to conventional acupuncture in patients with peripheral facial paralysis.

Psychological status

Before treatment, there were no significant differences in SAS (P = 0.268) or SDS (P = 0.300) scores between the two groups (**Table 5**). After treatment, both groups showed significant reductions in SAS and SDS scores (P < 0.05). However, the YYHAT Group demonstrated greater significant reductions in both SAS (P = 0.023) and SDS (P = 0.001) scores compared to the conventional group. These findings suggest that YYHAT is more effective in alleviating both anxiety and depression in patients with peripheral facial paralysis compared to conventional acupuncture.

Patient satisfaction

Patients in the YYHAT group reported significantly higher satisfaction regarding perceived treatment effectiveness (P = 0.020) compared

Table 4. Comparison of therapeutic efficacy between the two groups

Parameters	Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	χ^2	P
Clinical recovery	16 (16.00%)	36 (35.29%)	12.151	0.007
Markedly effective	34 (34.00%)	33 (32.35%)		
Effective	31 (31.00%)	24 (23.53%)		
Ineffective	19 (19.00%)	9 (8.82%)		

Table 5. Comparison of psychological status between the two groups

Parameters		Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	t	P
SAS Score	Before Treatment	50.27 ± 5.96	49.39 ± 5.31	1.111	0.268
	After Treatment	42.47 ± 3.26*	41.25 ± 4.21*	2.299	0.023
SDS Score	Before Treatment	50.58 ± 4.98	49.86 ± 4.85	1.040	0.300
	After Treatment	40.15 ± 3.48*	38.72 ± 2.54*	3.332	0.001

SAS: Self-Rating Anxiety Scale; SDS: Self-Rating Depression Scale. *: before treatment vs after treatment, P < 0.05.

Table 6. Comparison of patient satisfaction between the two groups

Parameters	Conventional Acupuncture Group (n = 100)	Yin-Yang Harmonizing Acupuncture Group (n = 102)	t	p
Perception of Treatment Effectiveness	4.76 ± 1.06	5.12 ± 1.11	2.347	0.020
Perception of Medical Staff's Professionalism	4.97 ± 0.52	4.99 ± 2.15	0.087	0.931
Perception of Medical Staff's Attitude	5.15 ± 0.32	5.20 ± 0.74	0.713	0.477

to the conventional acupuncture group (**Table 6**). However, there were no significant differences in the perceptions of medical staff's professionalism (P = 0.931) or attitude (P = 0.477). These results indicate that while YYHAT was associated with higher subjective satisfaction regarding therapeutic outcomes, patient perceptions of the professionalism and attitude of the medical staff were similar between the two groups.

Discussion

This study aimed to evaluate the clinical efficacy of Yin-Yang Harmony Acupuncture Therapy compared to conventional acupuncture in treating facial muscle dysfunction and resting state facial appearance in patients with peripheral facial paralysis. Our findings demonstrated significant improvements in both sEMG latency and amplitude in the YYHAT Group. These enhancements are likely attributed to several underlying mechanisms. Acupuncture may stimulate specific neurological pathways, leading to increased neuroplasticity and nerve regeneration [21]. The addition of acupoints Shuigou and Chengjiang in the YYHAT protocol may further contribute to these outcomes. In TCM, these points are believed to play a crucial role in facial nerve regulation and functional recovery [22]. Meanwhile, the improvement in sEMG amplitude may signal enhanced muscle fiber recruitment and synchronization. These changes could be mediated by the acupuncture-release of neurotransmitter such as endorphins and enkephalins, which have been shown to reduce inflammation, alleviate pain, further promoting optimal muscle function [23, 24]. The combination of targeted acupoint selection and traditional acupuncture techniques of YYHAT appears to offer significant benefits in improving neuromuscular function in peripheral facial paralysis.

The Doppler ultrasound findings revealed significant increases in EDV and Vs in the YYHAT group, suggesting improved facial arterial blood flow. Acupuncture may stimulate vasodilation and enhance peripheral circulation, possibly by activating neurovascular nodes along acupuncture meridians [25, 26]. This effect is believed to be linked to increased local secretion of

nitric oxide and other vasodilatory agents in response to needle stimulation. Additionally, improved microcirculation likely contributes to enhanced tissue oxygenation and nutrient delivery, facilitating expedited nerve regeneration and functional recovery [27]. Though no significant changes were observed in the resistance index (RI), the improvements in EDV and Vs suggest that YYHAT effectively enhances microcirculatory dynamics, supporting its clinical utility in promoting facial nerve recovery.

Furthermore, therapeutic outcomes based on modified Portmann scores were significantly superior in the YYHAT group. Rooted in the holistic framework of TCM, Yin-Yang theory emphasizes the dynamic balance of opposing forces to maintain internal stability. It promotes equilibrium between sympathetic and parasympathetic activity via modulation of autonomic nervous system function [28]. This balance may help reduce facial muscle hypertonicity, improve neuromuscular coordination, and accelerate functional recovery. YYHAT offers a comprehensive and integrative approach to the management of peripheral facial paralysis.

In this study, patients in YYHAT group showed significantly decreased anxiety and depression scores compared to the conventional group. It helps patients stick to treatment plans. The psychological benefits of acupuncture may be partly attributed to its regulatory effects on the hypothalamic-pituitary-adrenal (HPA) axis, a key component of the stress response system. Acupuncture has also been shown to modulate levels of neurotransmitters, which play vital roles in mood regulation [29-31]. Additionally, the ritualistic and culturally embedded aspects of acupuncture may elicit a placebo response, contributing to emotional resilience and enhanced self-efficacy. Therefore, YYHAT not only improves physical symptoms but also positively impacts psychological well-being.

The findings regarding patient satisfaction further underscore the clinical value of YYHAT in enhancing perceived treatment effectiveness, a valuable outcome in integrative medicine practices. Elevated satisfaction may stem from both objective clinical improvements and subjective experiences of physical and emotional well-being. Acupuncture aligns with patient expectations for holistic, non-pharmacological treatments, often perceived as safer, more natural, and tailored to individual needs. However, it should be noted that there were no differences in the perceptions of medical staff professionalism and attitudes between the two groups, suggesting that the observed satisfaction enhancement is attributable to the therapy itself, rather than external provider-related factors.

Our study findings indicate that YYHAT surpasses conventional acupuncture in improving both physiological and psychological parameters in patients with peripheral facial paralysis. This is consistent with previous research [32] demonstrating the efficacy of acupuncture protocols incorporating specific acupoints (such as Shuigou and Chengjiang) in promoting nerve regeneration and functional recovery in neurological disorders. Unlike prior studies, we observed not only significant improvements in facial muscle function but also a marked reduction in patients' psychological states (such as anxiety and depression scores), indicating a broader therapeutic effect. While traditional acupuncture has been shown to assist in facial muscle recovery, it has not consistently demonstrated substantial benefits in mental health parameters [33] or patient-reported satisfaction and quality of life [34]. In our study, YYHAT led to notable improvements in both domains, highlighting its value within integrative medicine frameworks. In conclusion, YYHAT offers distinct advantages by addressing both physical and psychological well-being in patients with peripheral facial paralysis.

Despite promising results for YYHAT in the treatment of peripheral facial paralysis, several limitations must be acknowledged. The sample size was relatively small, which may limit the generalizability of the findings. Additionally, the study was not double-blinded, introducing potential bias. Variability in practitioner experience and technique may also have influenced treatment consistency. Furthermore, we did not fully account for confounding variables, such as patients' baseline health status or concurrent therapies, which could have affected outcomes. Importantly, responses to acupuncture vary across individuals due to factors such as initial health condition, accuracy of acupoint location, and patient expectations. The complexity of peripheral facial paralysis, which involves multiple systems and varying degrees

of nerve injury, highlights the need for personalized treatment strategies. Future research should include larger, more diverse cohorts, representing different severities and etiologies of facial paralysis. Studies should also employ stricter methodological controls and, where feasible, and incorporate blinded outcome assessments. Longitudinal studies would be valuable to assess the durability of therapeutic effects.

The integration of traditional acupuncture philosophies, such as Yin-Yang balance, with modern neurophysiological principles, presents a compelling framework for future innovation in neurorehabilitation. This fusion of traditional and modern approaches not only broadens treatment possibilities but also supports the advancement of evidence-based integrative medicine.

Conclusion

This study presents compelling evidence that YYHAT works better than conventional methods in treating peripheral facial paralysis, with significant improvements observed in both physical and mental health. These findings contribute to the growing body of literature supporting acupuncture's therapeutic potential and underscore its value within integrative medical frameworks aimed at delivering comprehensive, patient-centered care. Nonetheless, further research involving larger, more diverse populations and employing rigorous methodological designs is warranted to validate these outcomes and to elucidate the underlying biological mechanisms of Yin-Yang Harmony Acupuncture Therapy.

Disclosure of conflict of interest

None.

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References

[1] Lassaletta L, Morales-Puebla JM, Altuna X, Arbizu Á, Arístegui M, Batuecas Á, Cenjor C, Espinosa-Sánchez JM, García-Iza L, García-Raya P, González-Otero T, Mañós M, Martín C, Morales da S, Roda JM, Santiago S, Benítez J, Cavallé L, Correia V, Estévez JM, Gómez J, González R, Jiménez J, Lacosta JL, Lavilla MJ, Peñarrocha J, Polo R, García-Purriños F, Ramos F, Tomás M, Uzcanga M, Vallejo LÁ and Gavilán J. Facial paralysis: clinical practice guideline of the Spanish Society of Otolaryngology. Acta Otorrinolaringol Esp (Engl Ed) 2020; 71: 99-118.

[2] Kim SJ and Lee HY. Acute peripheral facial palsy: recent guidelines and a systematic review of the literature. J Korean Med Sci 2020; 35: e245.

[3] Yu Z, Shen M, Shang W, Wu J and Xuan L. Timing of acupuncture treatment in peripheral facial paralysis: a systematic review and meta-analysis. Comput Math Methods Med 2021; 2021: 4221955.

[4] Avellan S and Bremell D. Adjunctive corticosteroids for lyme neuroborreliosis peripheral facial palsy-a prospective study with historical controls. Clin Infect Dis 2021; 73: 1211-1215.

[5] Jin DD, Ye J, Guo M and Zhou JW. Efficacy of acupuncture-moxibustion on peripheral facial paralysis at different time points: a meta-analysis. Zhongguo Zhen Jiu 2020; 40: 664-668.

[6] Shan Z. Electron microscope observation of acupuncture and nerve repair in the treatment of peripheral facial paralysis. Emerg Med Int 2022; 2022: 5432223.

[7] Cheng L, Li XL, Ying Y, Du SH, Zhang XD, Guo W, Mi SQ and Zhao JP. Should acupuncture therapy be used for acute facial paralysis? A protocol for systematic review. Syst Rev 2023; 12: 43.

[8] Deng X, Zhu H, Shi L, Li Y, Shi H, Wu Y and Zhang Y. Comparison of the efficacy of acupuncture with tuina with acupuncture-only in the treatment of peripheral facial paralysis: a network meta-analysis. Intern Emerg Med 2024; 19: 839-858.

[9] Zhu JM, Zhuang R, He J, Wang XX, Wang H and Zhu HY. Yin-yang balance penetrating acupuncture combined with rehabilitation training on upper limb spasticity in stroke hemiplegia. Zhongguo Zhen Jiu 2020; 40: 697-701.

[10] Zhao WF, Ren YY, Zeng BX, Lu H, Yue Y, Zhang T and Zhou ZJ. Yin-yang penetrating acupuncture with elongated needle for spastic limb dysfunction after stroke: a randomized controlled trial. Zhongguo Zhen Jiu 2021; 41: 711-715.

[11] DeBord K, Ding P, Harrington M, Duggal R, Genther DJ, Ciolek PJ and Byrne PJ. Clinical application of physical therapy in facial paralysis treatment: a review. J Plast Reconstr Aesthet Surg 2023; 87: 217-223.

[12] Finsterer J. Management of peripheral facial nerve palsy. Eur Arch Otorhinolaryngol 2008; 265: 743-752.

[13] Wen J, Chen X, Yang Y, Liu J, Li E, Liu J, Zhou Z, Wu W and He K. Acupuncture medical therapy

and its underlying mechanisms: a systematic review. Am J Chin Med 2021; 49: 1-23.
[14] Chi JJ. Management of the eye in facial paralysis. Facial Plast Surg Clin North Am 2016; 24: 21-28.
[15] Kim J, Lee JM, Nam SI and Baek MJ. Surgical reconsideration of traumatic facial paralysis. Otol Neurotol 2022; 43: 968-972.
[16] Liu Z, Wen X, Shao Y, Wan Z, Liu B, Wang R and Liu H. Efficacy of repetitive transcranial magnetic stimulation at different sites for peripheral facial paralysis: a prospective cohort study. Front Neurol 2023; 14: 1285659.
[17] Kroumpouzos G, Harris S, Bhargava S and Wortsman X. Complications of fillers in the lips and perioral area: prevention, assessment, and management focusing on ultrasound guidance. J Plast Reconstr Aesthet Surg 2023; 84: 656-669.
[18] Yue T, Li Q, Wang R, Liu Z, Guo M, Bai F, Zhang Z, Wang W, Cheng Y and Wang H. Comparison of Hospital Anxiety and Depression Scale (HADS) and Zung Self-Rating Anxiety/Depression Scale (SAS/SDS) in evaluating anxiety and depression in patients with psoriatic arthritis. Dermatology 2020; 236: 170-178.
[19] Xu DY, Zhao NJ, Zhao YX, Luo D, Sun YJ and Li KY. Positions of the implanted stimulating electrodes for artificial facial nerve for inducing contraction of the orbicularis oris muscle in rabbit with peripheral facial paralysis. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi 2017; 52: 841-845.
[20] Sánchez-Legaza E, Meléndez Guerrero B, Sánchez Legaza B and Idelfonso Miranda J. Acoustic neurinoma shown as a facial palsy. An Otorrinolaringol Ibero Am 2007; 34: 565-572.
[21] Cao X, Zhang HJ, Xu G, Ma XX, Pu XL, Ma WJ, Zhang D, Tian ZD and Zhang WH. Post-stroke dysphagia treated with four-step acupuncture therapy for opening orifices and benefiting throat combined with neuromuscular electrical stimulation: a randomized controlled trial. Zhongguo Zhen Jiu 2023; 43: 611-614.
[22] Zheng SM, Zhao FL, Luo YY, Lin XF and Wen MY. Clinical effect of electroacupuncture at Baihui and Shuigou points in treatment of brain injury in patients with sepsis-associated encephalopathy. Zhen Ci Yan Jiu 2020; 45: 402-406.
[23] Fredy DM, Harpin D and Mihardja H. The role of acupuncture for myofascial pain syndrome (MPS) in interventional pain management. J Complement Integr Med 2022; 19: 213-217.
[24] Chen Y, Li D, Li N, Loh P, Guo Y, Hu X, Zhang J, Dou B, Wang L, Yang C, Guo T, Chen S, Liu Z, Chen B and Chen Z. Role of nerve signal transduction and neuroimmune crosstalk in mediating the analgesic effects of acupuncture for neuropathic pain. Front Neurol 2023; 14: 1093849.
[25] Liu Y, Yu Z, Jiang JF and Xu B. Exploration on acupuncture regulation pathways based on neurovascular coupling. Zhen Ci Yan Jiu 2022; 47: 83-87.
[26] Zhu PY, Sun MM, Yu TY, Li Y and Sun ST. Professor SUN Shen-tian's clinical experience of acupuncture and moxibustion for peripheral facial paralysis. Zhongguo Zhen Jiu 2021; 41: 189-191.
[27] Yeoh S, Warner WS, Merchant SS, Hsu EW, Agoston DV and Mahan MA. Incorporating blood flow in nerve injury and regeneration assessment. Front Surg 2022; 9: 862478.
[28] Dusi V, De Ferrari GM and Mann DL. Cardiac sympathetic-parasympathetic interaction: the endless story of Yin and Yang. JACC Basic Transl Sci 2020; 5: 811-814.
[29] Li M, Niu J, Yan P, Yao L, He W, Wang M, Li H, Cao L, Li X, Shi X, Liu X and Yang K. The effectiveness and safety of acupuncture for depression: an overview of meta-analyses. Complement Ther Med 2020; 50: 102202.
[30] Chen B, Wang CC, Lee KH, Xia JC and Luo Z. Efficacy and safety of acupuncture for depression: a systematic review and meta-analysis. Res Nurs Health 2023; 46: 48-67.
[31] Yang NN, Lin LL, Li YJ, Li HP, Cao Y, Tan CX, Hao XW, Ma SM, Wang L and Liu CZ. Potential mechanisms and clinical effectiveness of acupuncture in depression. Curr Neuropharmacol 2022; 20: 738-750.
[32] Chavez LM, Huang SS, MacDonald I, Lin JG, Lee YC and Chen YH. Mechanisms of acupuncture therapy in ischemic stroke rehabilitation: a literature review of basic studies. Int J Mol Sci 2017; 18: 2270.
[33] Cellis M. A multifaceted approach to the acupuncture treatment of neuromuscular facial conditions. J Chin Med 2016; 110: 5.
[34] Kawakita K and Okada K. Acupuncture therapy: mechanism of action, efficacy, and safety: a potential intervention for psychogenic disorders? Biopsychosoc Med 2014; 8: 4.