



Efficacy of different modalities and exercise therapy on facial palsy patients (A mini review)

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Abstract

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Declaration of Interest:

The authors declare that there is no conflict of interest in this



Background: Facial palsy is a neurological condition characterized by facial muscle weakness or paralysis, which can lead to reduced functional recovery, difficulty teaching functional movement, life challenges and also reduced quality of life. While the condition can stem from wither central or peripheral lesions, this review focuses primarily on peripheral facial palsy, especially Bell's palsy. Medication plays a vital role during the acute stage, while physical therapy and rehabilitation help support facial motor recovery and improve long-term functional outcomes.

Objective: Reviewing the available evidence or literature for checking the efficacy of pharmacological treatments and physiotherapy-based modalities and exercise therapy used in management of facial palsy, with focus on Bell's palsy and peripheral facial palsy.

Methods/Design: Previously published clinical trials, relevant clinical guidelines and systemic reviews or meta-analysis were used for this literature review. Its main focus is the pharmacological and rehabilitation interventions for facial palsy. The literature evidence that was published within ten to fifteen year gap was considered, where emphasis was on corticosteroids, antiviral therapy, facial exercises, neuromuscular training, mirror therapy, biofeedback, electrical stimulation, proprioceptive neuromuscular stimulation and low level laser therapy. **Setting:** Primary care and outpatient physical rehabilitation settings.

Participants: The adults diagnosed with facial palsy, specifically patients diagnosed with (acute, sub-acute, or chronic) idiopathic peripheral facial paralysis or Bell's palsy.

Interventions: From pharmacological point of view, interventions included systemic corticosteroids, antiviral therapy, and supportive eye care. From physiotherapy the interventions included facial exercises, neuromuscular training, mirror-based therapy, biofeedback, proprioceptive neuromuscular facilitation, electrical stimulation and low-level laser therapy. **Primary Outcome Measures:** Facial motor recovery and functional symmetry, measured chiefly by the House-Brackmann Scale and Sunnybrook Facial Grading system alongside patient reported facial disability and quality of life tools where available. **Results:** Within 72 hours of symptoms onset, early administration of corticosteroid provides the best management for acute stage Bell's palsy. Due to limited additional benefits antiviral therapy may be added depending on the disease severity and clinical symptoms of the patient. In the rehabilitation approach optimal facial exercises and neuromuscular retraining are helpful in improving facial function and enhancing patient's quality of life. Mirror therapy and biofeedback may improve facial symmetry, but the supporting evidence remains limited. On the other hand, electrical stimulation has shown inconsistent results while laser therapy has limited supporting research. Overall, variations in treatment settings, disease stages, and severity and treatment protocols make it difficult to compare these different therapies.

Conclusion: For facial palsy, treatment requires individualized, team work rehabilitation. In the acute stage of Bell's palsy, evidence-based pharmacologically treatment is effective while physiotherapy and rehabilitation exercises also contribute to recovery and improve the well-being of patients. Various modalities may be helpful in treating this condition; however, future research is required to identify optimal treatment strategies, either alone or in combination with other treatment for effective management of the condition.

Trial Registry: Not applicable.

Introduction:

Facial palsy is a neurological condition characterized by weakness or paralysis of the muscles of face and can difficulties in activities of daily living, change how you look and hurt your mental health. This problem can alter how your face moves and lowers your overall quality of life e.g. eye closure, expression control, mouth control etc. Facial palsy can either be caused as a result of a central lesion or due to peripheral facial nerve dysfunction. Bell's palsy is the most common form of acute idiopathic peripheral facial palsy. It can occur in both genders and it is reported to be higher in individuals with conditions like diabetes and hypertension and during pregnancy. (1,2)

Facial palsy has two clinical presentations according to location of the lesion, called central and peripheral palsies. Central facial weakness that occurs commonly with conditions like stroke or brain injury, generally affects the contralateral side of the face where forehead is relatively preserved. On the other hand, peripheral facial palsy involves the ipsilateral upper and lower halves of the face (including forehead). Bell's palsy represents an acute peripheral lower motor neuron facial palsy. For assessment, the commonly used tools are clinical facial grading systems such as House-Brackmann Scale and Sunnybrook Facial Grading System. (3) This review aims to examine the effectiveness of different pharmacological and physiotherapy based intervention on facial palsy, particularly Bell's palsy and peripheral facial palsy. Their effects on facial motor function, facial symmetry, functional disability and quality of life are considered in this review.

Pathophysiology:

In Bell's palsy, also known as idiopathic peripheral facial paralysis, the seventh cranial nerve lesion causes dysfunction, which leads to weakness or paralysis of the facial muscles. The exact pathophysiology is uncertain, but viral reactivation, like in herpes simplex type 1 virus, inflammation and immune response, all are thought to play important roles. Since the facial nerve moves through a narrow facial canal, swelling and inflammation can increase pressure on the nerve within that canal, cutting off microcirculation and leading to nerve dysfunction or in more severe cases of lesion, it can cause axonal injury. (4)

How much of the nerve is involved, directly influences both the clinical severity of the dysfunction as well as how well a patient recovers. Although many people recover on their own, some are left with long term facial weakness, asymmetry, incomplete eye closure, or a complication called post paralytic synkinesis. These complications highlight why early medical treatment and follow up rehabilitation are important for recovery and for helping patients regain facial movements. (4)

Classification of Facial palsy

According to location of lesion, facial palsy can be classified into central facial weakness (upper motor neuron) or peripheral facial palsy (lower motor neuron). The facial nerve itself is a peripheral cranial nerve; therefore we distinguish this lesion based on whether the corticobulbar pathways are affected before or after the facial nucleus level and facial nerve pathway. Central UMN lesions, such as those occurring following stroke or traumatic brain injury, typically produce weakness of the contralateral lower face with relative preservation of forehead movement because the upper facial muscles receive bilateral cortical input. In contrast, peripheral LMN lesions affect the entire ipsilateral side of the face, including the forehead and eyelids. Bell's palsy is an idiopathic acute form of peripheral LMN facial palsy. (1,3)

Causes:

Depending on whether the weakness is central or peripheral, the causes vary for facial palsy. Central facial weakness occurs in association with neurological conditions like stroke and traumatic brain injury, whereas peripheral facial palsy can occur as a result of Bell's palsy, infections, trauma, neoplastic disease, ontological conditions and iatrogenic injuries. Bell's palsy is taken to be idiopathic because most of the time a definite cause is not identified. Viral cause reactivation like in case of herpes simplex type 1 has been considered as one possible contributor to bell's palsy, although its exact causal role is yet to be established.

Other known causes of peripheral facial nerve dysfunction include varicella zoster infection, otitis media, Lyme's disease, Melkersson Rosenthal syndrome, tumors, temporal bone trauma, and surgical injury. So when determining the appropriate treatment approach, the underlying causes and clinical presentation need to be considered. (2,3)

Symptoms:

Clinical presentations of facial palsy vary depending on the underlying cause and severity of nerve involvement. Common symptoms of peripheral facial palsy include unilateral facial weakness or paralysis, facial drooping, difficulty with eye closure, dry eyes, dry eyes or excessive tear production. Commonly the symptoms that occur in peripheral facial palsy include unilateral facial weakness, facial drooping, difficulty with closing the eye, dry eyes, or excessive tears, altered facial expression and difficulty controlling the lips and mouth. Patients may also experience pain around the mastoid region, speech or eating difficulties and facial spasm with discomfort. (3)

Facial palsy causes not only functional loss but also the cosmetic (look wise) disability that reduces quality of life. Incomplete eye closure increases the risk of complications at the ocular level, while persistent

weakness can cause facial asymmetry. During recovery, abnormal reinnervation can result in synkinesis, a condition in which involuntary facial movements occur together with voluntary facial expression. (4)

History and working model of Bell's palsy:

Bell's palsy is considered the most common form of acute idiopathic peripheral facial paralysis. Its incidence range from 11.5 to 53.3 cases per 100,000 per year. The condition develops rapidly and causes partial or complete paralysis on one half of the face. This condition leads to a difficult life for the patients, making it difficult for patients to close their eye, control their mouth, speak, eat, and make normal expressions. Diagnosis is primarily clinical and requires ruling out other potential causes such as trauma, tumors, infections, surgical injuries and other neurological causes. (1)

The exact cause of Bell's palsy remains unclear, but several contributing factors have been recognized. These include an anatomical tightness of the facial nerve within the bony facial canal, viral triggers like HSV-1, inflammation, swelling, and secondary blood flow restriction or compression. Symptoms are typically at their worst during initial stage, with recovery gradually occurring the following weeks or months (2, 4).

Prognosis:

Generally, the prognosis for Bell's palsy is favorable for the patients, where many of them showing substantial recovery within weeks or months. However, there are several factors that cause variation in recovery, and the factors include the initial severity of paralysis, patient age, pregnancy status, and the extent of facial nerve involvement. Electrophysiological assessments such as electromyography (eMG) and electroneuronography may provide additional information about the nerve injury and prognosis, especially in patients with more severe paralysis. (4–6)

Even though many patients recover completely, some may experience persistent facial weakness, asymmetry, incomplete eye closure, or synkinesis which can negatively affect facial function and quality of life. The more severe the presentation, the less favorable recovery. Pregnancy, particularly onset during late pregnancy or the early postpartum period, has also been associated with poorer long-term outcomes in some studies. (7)

Tools for Evaluation:

Evaluation of facial or Bell's palsy involves both clinical and instrumental tools to assess the severity, progression and functional impact of facial nerve involvement. These tools help in grading

facial muscle function, identifying asymmetry and planning appropriate rehabilitation strategies (8)

House-Brackmann (H-B) Scale

The House Brackmann scale is employed to evaluate the degree of the facial nerve involvement in patients with facial palsy. It measures the elevation movement of the middle third of the eyebrow and the distractive movement of the oral commissure. However, the input and output are in grades, and it only has six to avoid excessive precision. It also lacks elaborate data about different abnormal zones in the facial domain. Lack of resolution in measuring small changes, it rarely applies in observation of changes during rehabilitation processes (9).

Facial Grading System (FGS)/ Sunnybrook Scale

This grading system was established to provide a more detailed and less injurious assessment of oro-facial muscle activation. It also oversees the progress achieved by therapeutic interventions. It gives a numerical measure of facial movements as a percentage; enables comparison of the movement of the controlled and non-controlled side of the face; and gives an instrument to monitor meaningful changes for later (9).

Three Areas of Evaluation included in the grading system are:

- i. Resting symmetry.
 - ii. Optional contraction of the facial muscles.
 - iii. Synkinesis (when there is an additional movement and the intended movement is consciously made).
- Assessment Process includes five standard expressions are evaluated: Eyebrow raise, Facial blinks, Wide mouth smile, Pout, Snarl. Each of the expressions received a work-z score independently, and then a total composite score was obtained (10). Advantages of this scale are as follows: It has intra-observer and inter-observer reliability. It also motivates the patient by giving clear feedback to the progress in the rehabilitation program (11).

Pharmacological management and Eye care

Pharmacological Intervention:

Pharmacological management of facial palsy primarily aims to reduce inflammation, support nerve recovery and manage associated symptoms. Commonly used drugs include corticosteroids and antiviral agents, especially in the early stages.

Corticosteroids:

Systemic corticosteroids are thought of as the main pharmacological treatment for acute Bell's palsy. They are anti-inflammatory in their effects and so are thought to reduce facial nerve inflammation and

edema. The treatment is most beneficial when initiated early, preferably within 72 hours of symptoms onset. Oral prednisolone is the standard choice, depending on the specific treatment option and patient individual factors, though the dosage and duration may vary. Before starting corticosteroids therapy, clinicians need to weigh potential contraindications and comorbidities that can occur. Especially for patients with diabetes, corticosteroidal therapy needs to be considered for potential harm it can cause, because glucocorticosteroids can easily disrupt blood sugar control. For this reason, treatment must be tailored according to the individual instead of using one dosage plan for every patient. Overall one can say, the clinical guideline that recommends corticosteroid treatment within 72 hours should remain the standard care.

Antiviral Agents:

The role of antiviral therapy in Bell's palsy is much more limited than that of corticosteroids. In mild to moderate cases, combining steroid therapy with antiviral medications for the treatment of Bell's palsy provides little additional benefits according to existing systemic reviews. Combination therapy may be beneficial of severe muscle weakness or when a viral cause, such as persistent herpes zoster infection is suspected (1).

Acyclovir and valacyclovir are included as treatment option in the current study. Treatment is determined according to disease severity rather than prescribing antiviral medications to every patient.

Eye Management:

In peripheral facial palsy, the inability to achieve complete eye closure is a critical challenge. Reduced blinking and corneal exposure can lead to dryness and cause injury due to contact with harmful substances. Protective measures should be followed to prevent damage to corneal integrity. Eye drops can be used to provide artificial tears and prevent eye dryness, while appropriate eye lubricants can be applied at nights. The eye can also be covered with an eye patch. Early eye protection is required for better recovery during the acute stage of management.

Physical Therapy Approach (Modalities and Exercises)

Facial Exercises and Neuromuscular Retraining

Facial exercises are commonly used by physiotherapist for the management of peripheral facial weakness. Rehabilitation usually focuses on precise facial movements, targeted specific facial muscles and guiding home-based exercises for better recovery. These exercises are helpful in regaining or rebuilding muscles strength and improving muscles functions, as mentioned in systematic reviews. However, it is difficult to compare these interventions

due to a lack of standardized treatment protocols and variations in disease stages (12). Recent research has focused on combining stretching with facial exercises to treat muscle weakness. The main aim of this combined approach is to improve facial muscle strength, symmetry and voluntary movement while helping patient perform exercise- based practices to regain facial muscles functions.



Figure 2: Figure 4: Guided self-rehabilitation exercise. A) Neutral facial expressions B) Raise the eyebrows using the frontalis muscle C) Orbicularis oris. D) Zygomaticus muscle (20).

Figure 2: Figure 4: Guided self-rehabilitation exercise. A) Neutral facial expressions B) Raise the eyebrows using the frontalis muscle C) Orbicularis oris. D) Zygomaticus muscle (20).

Proprioceptive Neuromuscular Facilitation

According to the Kabat method, Proprioceptive neuromuscular facilitation (PNF) is an effective rehabilitation approach. In this techniques, facial exercises emphasizes regaining , facial muscle strength, reinforce resistance and improving muscle strength and effectively performing facial muscles function. Combining the Kabat approach with medical management for treating Bell's palsy lead to more effective recovery compared with medical treatment alone.

Other comparative studies have also investigated Kabat rehabilitation in relation to facial disability, synkinesis, and electrophysiological outcomes. However, the available evidence is based on relatively specific patient populations and treatment protocols, so the findings should not be generalized to every patient with facial palsy. (13)

Biofeedback and Mirror Visual Feedback

Mirror visual feedback can be incorporated into facial exercises to provide patients with visual information about facial symmetry and movement. It may assist patients in practicing controlled facial movements and improving awareness of asymmetrical movement. Mirror-based approaches have been investigated particularly in patients with persistent facial dysfunction.

Electromyographic (EMG) biofeedback provides an additional method of feedback by displaying muscle activity during facial movement. It may be used to help patients recognize excessive or unwanted muscle activation and improve selective motor control, particularly during rehabilitation of persistent facial dysfunction. (14)

Low Level Laser Therapy (LLLT)

Low-level laser therapy (LLLT), or photobiomodulation, has been studied as an adjunctive physical modality for Bell's palsy. It is helpful in speeding up chemical reactions, reducing swelling and enhancing tissues healing process. Laser guided therapy may be beneficial when used separately or in combining with other treatment protocols for facial weakness. However, limited studies exist regarding effective treatment protocol and treatment groups. In addition, studies are available on the beneficial use of laser therapy in Bell's palsy and uncontrolled diabetes mellitus and researcher conducted that 12 sessions of laser therapy were required to achieve effective results. Their results should be interpreted with cautions due to variations in treatment groups. Additionally, steroid therapy should not be replaced in the management of the condition.

Neuromuscular Electrical Stimulation:

In the rehabilitation of facial muscle weakness, neuromuscular electrical stimulation (NMES) is still an important area of interest. It is helpful for muscle activation and may prevent secondary complications, however; studies have been shown mixed results regarding its benefits. In fact, a study trial recently found that if selective electrical stimulation is added to standard physical therapy, did not noticeably improve functional recovery compared to only physical therapy. In addition, the risks like unintended muscle activation or triggering abnormal facial movements suggest that clinicians should approach this modality with caution, especially when facial nerve is still recovering. More research is needed to pinpoint exactly who benefits the most. It will also help discover the ideal timing, machine settings and long term outcomes. (15)

Clinical Synthesis

Current literature, indicates that optimal intervention depends entirely on the patient's specific pathology, impairment severity and recovery stage. For acute bell's palsy, data strongly supports corticosteroid therapy early in the disease, as the primary standard of treatment with routine addition of antivirals showing limited clinical value. Eye protection should be initiated when facial weakness results in incomplete eye closure.

Physiotherapy may complement medical management by targeting impaired facial motor control, asymmetry, functional limitations and persistent deficits. Facial exercises and neuromuscular retraining have demonstrated promising outcomes, while PNF, mirror based therapy, biofeedback and LLLT have also been explored as adjunctive rehab strategies. However, variation in disease stage, treatment protocols, and outcome measures limit direct comparison between

modalities. Electrical stimulation remains comparatively controversial and required further investigation before its role in routine rehabilitation can be clearly established.

Discussion:

This review paid most attention to appropriate individualized patient treatment and proper management for facial weakness. Corticosteroid therapy is helpful in the existing pharmacological management of facial weakness, in addition to the important role of antiviral treatment therapy in relation to clinical outcomes and disease severity. It is also helpful in protecting the ocular surface when incomplete eye closure is present.

For facial weakness physiotherapy management is beneficial for treating long-term facial muscle weakness and preventing persistent weakness in addition to medical management. PNF pattern exercises and specific facial muscle exercises are helpful in the proper management of facial muscles, regaining the strength of facial muscles and improving the well-being of patients. Other treatment approaches, such as mirror therapy, visual feedback, laser guided treatment and proprioceptive inputs are also helpful in treating patient's condition. Current studies present a larger number of effective treatment strategies for this condition; however, their effectiveness remains unclear making it difficult to reach a conclusion.

In addition to other interventions, electrical muscle stimulation may be an effective treatment in rehabilitation protocols. Existing studies have shown limited clinical results and although it may be helpful in treating facial muscle weakness, better recovery approaches are still required. Due to these shortcomings, future studies should focus on using appropriate standardized rehabilitation plans, clearly defined treatment strategies and effective outcome measurement tools. This may be helpful for comparative evaluation of this treatment with other techniques and may contribute to better patient recovery.

Limitations:

Previous studies have been limited due to variation in management protocols. Major variations have been observed in treatment groups, stages of facial weakness, level of nerve damage and treatment duration. Mostly clinical studies have used limited sample size along with other treatment strategies, which may affect the outcome measures. In addition to treatment plan, researches have paid less attention to long-term facial weakness and involuntary muscle contractions.

Recommendations for Future Research:

In the future, studies should be performed on large population to develop better treatment approaches.

Basically researchers should pay attention to selecting appropriate evidence-based treatment plans and outcome measures when conducting studies. This may also provide helpful management guidance for patients over a prolonged period to better understand prolonged facial muscles weakness and unwanted muscle movements (synkinesis). For maximum recovery, appropriate ideas proper dosages are required. Appropriate subject selection is helpful for achieving better treatment and rehabilitation outcomes particularly through laser-guided treatment therapy, proprioceptive input, visual feedback and electrical muscle stimulation.

Conclusion:

Facial weakness basically requires individualized management for patients. Its cause and effect on patient deeply are significant and also affects their social behavior, causes mental distress and disturb the function of mastication, which helps in eating and chewing. In the acute-stage of facial weakness, corticosteroids are used as a pharmacology treatment. For eye protection patients are instructed to protect the eye from dust and cover it properly, if eye not properly closed. Rehabilitation-based physiotherapy management provides better improvement in the functional movements of the facial muscles, reduces mouth deviation, improves muscle function and enhances the well-being of patients who from suffer this condition.

Facial exercises for regain muscle strength, alternate modalities mainly including mirror therapy, visual feedback and proprioceptive input, in addition to muscles stimulation based on electrical stimulation still more information to be well established along with their comparative effectiveness and other treatments. Additional variables strengthen the existing literature and also provide support for personalized treatment preference.

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16. Table 1: Sunnybrook Facial Grading System

SUNNYBROOK FACIAL GRADING SYSTEM									
Resting symmetry	Symmetry of voluntary movement					Synkinesis			
Compared to normal side	Degree of muscle EXCURSION Compared to normal side					Rate the degree of INVOLUNTARY MUSCLE CONTRACTION associated with each expression			
Eye Normal ☐ 0 Narrow ☐ 1 Wide ☐ 1 Eyelid surgery ☐ 1 Cheek (nasolabial fold) Normal ☐ 0 Absent ☐ 2 Less pronounced ☐ 1 More pronounced ☐ 1 Mouth Normal ☐ 0 Corner drooped ☐ 1 Corner pulled up/out ☐ 1 Total 0 Resting symmetry score Total×5 0	Standard Expressions	Unable to initiate movement	Initiate slight movement	Initiate movement with slight excursion	Movement almost complete	Complete movement	NONE: No synkinesis or mass movement Mild: slight synkinesis Moderate: Obvious synkinesis Severe: Disfiguring synkinesis	☐ 0 ☐ 1 ☐ 2 ☐ 3	☐ 0 ☐ 1 ☐ 2 ☐ 3
	Brow lift (Fro)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 0	☐ 0	☐ 1
	Gentle eye closure (OCS)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 0	☐ 0	☐ 1
	Open mouth smile(SYG/RIS)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 0	☐ 0	☐ 1
	Snarl (LLA/LLS)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 0	☐ 0	☐ 1
	Lip Pucker (OOS/OOI)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 0	☐ 0	☐ 1
	Gross Asymmetry							☐ 0	☐ 1
	Severe asymmetry							☐ 1	☐ 2
	Moderate Asymmetry							☐ 2	☐ 3
	Mild Asymmetry							☐ 3	☐ 4
	Normal Asymmetry							☐ 4	☐ 5
	Total						0		
	Total						0		
	Synkinesis score Total							0	0
Patient's name _____ Diagnosis _____ Date _____	Vol. movement score 0 - Resting symmetry score 0 - Synkinesis score 0 = composite score 0								

Table 2: Various Interventions with standard Protocols and Major outcomes

Intervention	Target Population / Disease Stage	Standard Protocol & Duration	Major Outcome Measures	Reported Clinical Efficacy & Major Findings	Level of Evidence & Supporting Reference
Systemic Corticosteroids	Acute Bell's palsy within 72 hours of onset.	Oral prednisolone 50–60 mg daily for 10 days	HB Scale; complete recovery rate	Suppresses perineural edema; significantly reduces rates of permanent incomplete recovery.	(1)
Corticosteroids + Antivirals	Severe Bell's palsy (HB V-VI) or Ramsay Hunt Syndrome	Corticosteroids paired with oral antivirals (acyclovir/valacyclovir) for 7-10 days	HB Scale; incomplete recovery; synkinesis.	No benefit over steroids in mild-to-moderate cases; May provide additional benefit in selected severe cases; evidence is limited compared with corticosteroid therapy alone.	(2)
Kabat Rehabilitation (PNF)	Acute/Subacute severe Bell's palsy (HB IV-V).	Diagonal manual resistance to facial fulcra; 2-3 sessions weekly for 2-4 weeks	HB Scale; recovery speed (days); ENoG parameters.	Double the probability of complete recovery; halves median recovery time (64.6 vs. 117.1 days) without increasing synkinesis risk	((3)
Low-Level Laser Therapy (LLLT)	Subacute Bell's palsy, specifically diabetic patients.	830 nm diode laser; 5 J per point across 8–9 facial nerve branches; 12 sessions over 4 weeks	HB Scale; Sunnybrook FGS; CMAP/NCV.	Potential adjunct or alternative investigated in selected patients unable to receive corticosteroids. Achieves 80% complete/partial recovery in diabetic patients within 3 months without glycemic disruption	(6)

Tailored Exercises & Stretching	Acute, subacute, or chronic Bell's palsy	Symmetrical, low-resistance expressions paired with manual stretching of the unaffected side (Abraham Joshua et al., 2024)	Sunnybrook FGS; FDI scores.	Significantly improves facial symmetry, voluntary excursion, and quality of life while suppressing synkinetic mass movements.	(7)
Mirror Visual Feedback	Subacute to chronic unrecovered palsy.	Symmetrical exercises using real-time mirror book reflection	Sunnybrook FGS; FDI physical/social	Visual biofeedback suppresses healthy-side overactivation. Achieves 24.9% increase in FGS and 24.5% in social scores.	(13)
Electrical Stimulation (NMES)	Acute/Subacute facial paralysis (Controversial).	Transcutaneous currents applied to contract facial muscles	Sunnybrook FGS; synkinesis scores.	Highly controversial. No clinical benefit in acute incomplete palsy; Evidence remains controversial; benefit has not been consistently demonstrated and concerns regarding its use during nerve recovery have been reported	(11)