

The Comparison between Exercise Therapy and Biofeedback Therapy in Facial Function and Quality Of Life of Bell's palsy

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Abstract

Introduction: Bell's palsy is the side effect of peripheral nerve palsy that causes low function of face and quality of life. This study was conducted to assess the effect of two different methods; exercise therapy and biofeedback therapy, accompanied with massage in two groups on facial function and quality of life of these patients. **Materials and Methods:** In this interventional research with before- after design, 20 patients with acute unilateral peripheral facial palsy participated in two separate programs. Function of face was measured by House Brackman and quality of life was evaluated by SF-36 questionnaire. In each group data were recorded before the intervention and 4 weeks (3 sessions per week) after it. Exercise therapy included receiving massage, doing patterns of Proprioceptive Neuromuscular Facilitation (PNF) and some exercises in front of mirror; besides, biofeedback therapy contained massage and muscular education by biofeedback set. After employing Kolmogorov-Simonov as a Test for normality, Independent T-test was utilized to compare means. **Results:** After one month doing two different programs in two exercise and biofeedback groups, remarkable increase of quality of life ($P \leq 0.001$) and also improvement of function of face ($P = 0.004$) were noticed in each group, but there was not any significant difference between quality of life ($P = 0.07$) and function of face ($P = 0.85$) in two groups. **Discussion:** This study indicated that with regard to suffering paralysis in Bell's palsy and its bad effects on patients' quality of life, the use of both biofeedback and exercise therapies as treatment is effective. It seems that increasing awareness of patients and training early movements have important role in improvement improve.

Key words: Bell's Palsy, Biofeedback, Massage, Exercise Therapy, Facial Function, Quality of Life

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Introduction

Bell's palsy or idiopathic peripheral facial nerve palsy is an acute unilateral mono neuropathy (1,2,3,4) with annual incidence rate of 20-30 cases in 100,000 (1,4) 60-70% of whom are acute unilateral facial nerve palsy (1). Despite the fact that the various treatments are suggested, there is no standard cure (2, 4, 5). Although, some mild involved cases do not require treatment

(6), chronic weaknesses in facial muscles of patients causes the decrease of their quality of life (4).

Bell's palsy begins suddenly (6) and it takes a few days or even several months. It will happen due to some syndromes, infections, traumas or tumors (7). Patient may suffer from different range of symptoms in different severity from mild weakness to total paralysis (6). Disability in affected side is occurred with dysfunction of laughing, whistling, opening wing

of noise, closing eye, scowling, elevating eyebrow (7, 8, 9) and also it may be associated with drooling, excessive tearing, existing pain around the jaw, dizziness, hypersensitivity to sound on the affected side, dryness of eye or mouth (6), impairment in eating and speaking (10) and sometimes decrease in sense (6, 10). So, referring to medicines and receiving exercises are effective ways to diminish these adverse effects (8). Fortunately, there is one millimeter per day (10) the axonal regeneration (6, 11,12) that initiates 2-3 weeks after beginning of disease (3, 6, 11, 12), but 30 per cent of patients experience incomplete recovery or side effects (3,6,11,13) such as long term spasm, synkinesis, crocodile tear syndrome, Marcus gun and jaw winking phenomena (14), even eye infection and loss of taste in long term (10).

Early and combinational medical treatments are recommended (14). Furthermore, there are different strategies in rehabilitation (12) for maintaining the muscle tones and stimulating sense (15); however, there is not any agreement about using them as exercise, electrotherapy (1, 4, 6, 16), biofeedback, laser therapy, massage and superficial heat (1, 12, 16). Nevertheless, these modalities have their own indications (16). For example, manual massage is useful to improve the perceptive awareness (10) and exercise is effective to prevent pathological synkinesis (14). Moreover, electromyography (EMG) biofeedback and doing exercises in front of mirror help motor re-education (6, 10) and control of synkinesis (10). Unfortunately, recovery can be long-term and incomplete (17) and it may takes 14 months (10, 12) or even until end of life (16).

Overall, besides physical impairments in face, discomforting in participation in doing social activities and diminishing mental health are considered (18, 19, 20). Furthermore, due to the lack of researches on the definite effective approach to be chosen by therapist (10), exercise therapy and biofeedback with massage with emphasis on raising awareness and educating patient for continuing exercise and increasing quality of life were used in this study.

Materials and Methods

This clinical trial with before-after design, after being confirmed by ethic committee of rehabilitation department clinic of Shohaday-e-Tajrish hospital in Tehran was performed in 2015. 20 patients with Bell's palsy were considered eligible to be distributed in one of two exercise or biofeedback groups for 3 days per week and totally 4 weeks in this study. The criteria to include the subjects were; having acute unilateral peripheral facial palsy under one month, receiving drugs (corticosteroids

and/or anti-virus) for 10-14 days, referring to rehabilitation clinic of Shohaday-e-Tajrish hospital and satisfying in participate. Also, the patients with central facial palsy, facial palsy recurrence, bilateral facial palsy, neurological, mental and psychological disorders, and other treatment for it, skin diseases and any contraindications for massage were not accepted to participate in the study (21).

In non-invasive biofeedback 22 minute treatment including 2 minutes slow stroking massage with oil and 20 minutes strengthening program to reduce elevating eyebrow, then, corner of lip, closing eye, scowling and pursing lips were implemented by biofeedback set (5 minutes for each of them)Also, patients in exercise therapy group received 22 minute treatment including 2 minutes massage and were educated on doing extensor or flexor patterns of neck associated with face movements of Proprioceptive Neuromuscular Facilitation (PNF) and 13 exercises in front of mirror for 20 minutes (5 times each). Exercises included elevating eyebrows after brushing forehead , also elevating corner of lips like saying "E" cheek after brushing of affected side of face, respectively, scowling, closing slowly eyes, closing only one of eyes alternately, wrinkling and opening wings of noise, opening mouth and saying "A", pursing lips like saying "O", saying alternately "E", "A", "O", smiling with and without showing teeth, wind-upping cheeks with closed lips, pressing lips, and finally reading and speaking aloud (22).

In addition to demographic questionnaire, function of affected side of face was measured by House Brackman that is graded from one (normal) to six (total paralysis) (23). Additionally, quality of life was evaluated by SF-36 questionnaire that is valid and reliable in Iran (24). Furthermore, Base line in biofeedback group was recorded before and after the intervention in biofeedback group. All before and after assessments were done by therapist. After data were gathering and coded, Kolmogorov-Simonov Test showed that there was normal distribution in independent variables expect in before intervention in biofeedback group ($P=0.043$). Also, analysis of means with Independent T-test was used to compare the differences between means of dependent variables by using statistical package SPSS-18.

Results

Table 1 indicates some demographic information of participants. The age average of participants in exercise and biofeedback group was 42 (± 16.21) and 45.4 (± 14.6) years and

Table 1. Demographic and clinical characteristics of patients (n=10 in each group)

Variable	Intervention group N (%)		P-value	
	Exercise	Biofeedback		
Sex	Male	50	40	1.000
	Female	50	60	
Job	Employed	70	20	0.07
	Unemployed	30	80	
Involved side	Right	40	50	1.000
	Left	60	50	
Bells H.	Yes	10	0	1.000
	No	90	100	
Family H.	Yes	0	0	1.000
	No	100	100	
Respiratory D.	Yes	0	0	1.000
	No	100	100	
Diabetes D.	Yes	50	40	1.000
	No	50	60	
Hypertension D.	Yes	20	30	1.000
	No	80	70	

Table 2 Mean±SD difference of variables in both groups (n=10 in each group)

Variable	Intervention group	Mean±SD	P-Value (within groups)	P-value (between groups)	
Base line	Biofeedback	Before	22.78±7.53	0.005	
		After	61.83±17.79		
Function of face	Exercise	Before	5.5±0.53	0.004	0.85
		After	2.9±0.74		
	Biofeedback	Before	5±0.67	0.004	
		After	2.5±0.7		
QOL	Exercise	Before	66.66±0.11	0.001	0.07

the average of body mass index (BMI) was 27.33 (± 2.97) and 28.35 (± 3.90) kg/m², respectively. Also, the average of distance between affecting until the initial assessment in exercise group was 2.15 (± 0.62) and biofeedback group 2.16 (± 0.61) months. It must be mentioned that none of the factors of age, sex, BMI, time of affected, job, involved side, hereditary factors and Underlying medical conditions had an impact on the outbreak of Bell's palsy ($P > 0.05$).

According to the independent-sample t-test in table 2, the means of function of face in exercise and biofeedback groups decreased significantly after 4 weeks of intervention ($P = 0.004$).

Also, the mean of base line before the intervention in biofeedback group was observed notably which was less than after the intervention ($P = 0.005$). In addition, the average of quality of life before the treatment in exercise and biofeedback groups 4 weeks after the treatment increased considerably ($P \leq 0.001$).

However, there was not any significant difference between quality of life ($P = 0.07$) and function of face ($P = 0.85$) in two groups.

Discussion

This study carried out to evaluate the comparison between exercise therapy and biofeedback therapy in acute Bell's palsy depicted significant increase in the function of face scores and functional improvement in two groups without any dramatic difference between them. In fact, there was no priority in advantages of exercise (1, 4, 6, 16) and biofeedback (1, 12, 16), and both of them helped motor learning improve. (6, 10). As mentioned previously, EMG biofeedback can develop voluntary movement and control of Synkinesis and is used for chronic paralysis, in particular when there is a movement by muscle power (10), but it influenced acute paralysis in this research, as well.. Moreover, Lobzin *et al.* reported that biofeedback had impressive effect on speeding up rehabilitation on the Bell's palsy (25). As well as, Parira *et al.* showed that exercise had effective functional issue (26). However, Dalla toffola received that EMG biofeedback was better than movement therapy (27)

that was not in line with the findings of the present study, maybe it requires more number of patients to be examined.

Also, according to this study there was an increase in the average of life quality both methods without any noticeable difference between them. Just like Beurrskenz *et al.* found out that mime therapy can decrease disability and increase quality of life in these patients (28). Taking all the findings mentioned into account, an increase in the ability of movement can improve quality of life.

Finally, it depicted that none of demographic characteristics and clinical factors of patients had a negative impact on the outbreak of Bell's palsy; however, researches showed pregnant women and diabetic patients engaged in respectively 3 times (29, 30) and 4 times more than others (31). Furthermore, other factors such as; age, blood pressure (11) and the upper respiratory diseases are considered as risk factors in Bell's palsy, too (6). In this study, the average of age in participants was 42-45.4 years. Researchers showed that it is less likely to get afflicted at age younger than 15 and older than 60 years (3) and the incidence is between the ages of 14-45 years (2). Also, present study demonstrated prevalence of Bell's palsy between women and men is the same at any age (1, 2, 32) like other articles findings. It is worth mentioning, the rate of incidence in the left and right was equal in this study which corresponds with the results of the study by Murthy (1) and the inheritance was not notable, compatible with the Doner's result (33).

Conclusion

This study showed, exercise and biofeedback accompanied with massage in Bell's palsy had the same significant decrease in function of face and increase in quality of life scores. Unfortunately with regard to the lack of intervention studies in our country, it is not possible to say how they do (6, 34,35). So, due to the need of restoring the ability of function of face and minimizing frustration in these patients, these results can be used as an introduction to the use of biofeedback and early exercise by researchers and therapists.

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Authors' contributions:

All authors made substantial contributions to conception, design, acquisition, analysis and interpretation of data.

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