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Positive Effects of Mime Therapy on Sequelae of Facial Paralysis: Stiffness, Lip Mobility, and Social and Physical Aspects of Facial Disability

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Objective: Evaluation of the effect of mime therapy, a novel therapy combining mime and physiotherapy, for patients with longstanding (at least 9 months) sequelae of unilateral peripheral facial paralysis.
Study Design: Randomized clinical trial, with the treatment group receiving mime therapy and the control group forming a waiting list.
Setting: Physiotherapy outpatient department of two university medical centers.
Patients: There were 50 patients, 21 men and 29 women, with sequelae of facial paralysis and a mean House-Brackmann score of Grade IV.
Intervention: Mime therapy, including automassage, relaxation exercises, inhibition of synkinesis, coordination exercises, and emotional expression exercises.
Main Outcome Measures: Stiffness of the face, lip mobility (both lip and pout length) and the physical and social index of the Facial Disability Index.

Results: Stiffness, lip mobility, and both aspects of the Facial Disability Index improved substantially because of mime therapy.

Conclusions: On the basis of present evidence, mime therapy is a good treatment choice for patients with sequelae of facial paralysis. **Key Words:** Facial Disability Index—Facial paralysis—Mime therapy—Physiotherapy—Randomized clinical trial.

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Since 1980, mime therapy, a combination of mime and physiotherapy, has been offered in The Netherlands to patients with sequelae of facial paralysis. Although mime therapy has shown satisfying results, there is no research to validate this claim. Many reports document that various therapies giving good results are used in the treatment of patients with facial paralysis (1). However, few randomized clinical trials are reported concerning effects of electromyographic biofeedback in combination with exercise therapy (2,3).

The aim of mime therapy is to improve symmetry of the face both at rest and during movement, simultaneously controlling synkineses; in the process, patients will look and feel better and have less problems with eating, drinking, speaking, and social integration. The treatment consists of a combination of automassage; relaxation exercises; and exercises to inhibit synkineses, enhance facial expression, and improve functional movements. To evaluate the effects of mime therapy, a randomized clinical trial (RCT) was started at the Physiotherapy Department of the University Medical Center (UMC) in April 1999; patients taking part in this research project were treated at two centers. The study was approved by the Advisory Committee on Ethics in Human Experimentation at the UMC. The central question in this research is, does mime therapy have positive effects on the functioning (impairment), disability, and handicap participation level of patients with sequelae of peripheral facial paralysis (4)? In this report, impairment is indicated by stiffness and lip mobility or immobility; disability and handicap are indicated by the physical and social aspects of the Facial Disability Index (FDI).

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METHODS

Design

The efficacy of mime therapy or rehabilitation of facial expression is assessed in a prospective study by comparing two groups of patients randomly assigned to receive mime therapy (treatment group) or to be on a waiting list (control group).

Patient population

Patients with peripheral facial paralysis who were referred to the physiotherapy departments by the general practitioner; ear, nose, and throat specialist; plastic surgeon; or neurologist were considered for the study. The patients had to meet the following criteria: 18 years or older; unilateral peripheral facial paralysis existing for at least 9 months; no dynamic correction (nerve or muscle reconstruction); absence of complete, partial, or central facial paralysis; absence of congenital facial paralysis; and sufficient knowledge of the Dutch language. All patients were informed by letter about the research project and a written consent for participation was requested.

Randomization

Patients who met the inclusion criteria and signed the consent letter were randomly assigned to one of two groups: the control group, which received no therapy; or the treatment group, which received mime therapy. Random assignment was performed within pairs of patients as they became available. If one patient was randomly assigned to the mime therapy group, the next patient of this pair automatically entered the control group and vice versa. For the first patient of a pair, an independent assistant of the physiotherapy administration department threw a dice.

Mime therapy

Mime therapy has been developed from the components mime and physiotherapy in treating patients with sequelae of facial paralysis (5). It consists of a combination of stimulation of facial emotional expression and functional movements. The aims of the treatment are to promote symmetry of the face at rest and during movement, enabling the patient to control synkineses or mass movements, resulting in better handling of the handicap. In the present research project, the number of treatment sessions is 10, each weekly session lasting approximately 45 minutes. The therapy is composed of sequentially structured exercises to align the two facial halves (to control and to reduce synkineses) and tasks to reintegrate emotions with expressions. Patients have to perform the exercises daily at home, assisted by a homework manual (6). Besides providing information concerning treatment and prognosis, the therapy consists of automassage of the face and neck; breathing and relaxation exercises; specific exercises for the face to coordinate both halves and to decrease synkineses; exercises in lip closure, necessary for eating, drinking, and rinsing of the mouth; letter and word pronunciation exercises; emotional expression exercises; and guidance in communication possibilities.

Measurement instruments

Data were collected concerning the level of impairment, disability, and handicap of the patient in pretest and posttest measures in both the treatment and the control groups. At the impairment level, stiffness and lip mobility or immobility were measured and disability was indicated by the physical subscale of the FDI, with the social subscale of the FDI indicating the degree of handicap.

Stiffness

To measure stiffness of the face, patients were asked to indicate the experienced stiffness on a five-point scale (1 = no stiffness, 5 = very stiff).

Lip mobility or immobility

To assess the functioning of the perioral muscles indicating mouth mobility, the length of the lips can be measured in two ways: pulling the corners of the mouth apart as far as possible and pulling the corners together. Both movements were quantified by calculating the lip-length (LL) and pout (P) indices (7,8). Pout is used in this context as a technical description of protrusion of the lips. Usually the word "pout" suggests an expression of annoyance or pique. In earlier references, the term "snout index" has been used. Because the word "snout" has different connotations in English as compared with Dutch and German (the nose of an animal as opposed to the mouth), the term "P index" is used.

The LL index was assessed by the physiotherapist using a sliding caliper and after a standard protocol proposed by Jansen et al (7). The LL index indicates the ratio between the intercommissural distance (ICD) in a resting position and the ICD during contraction of the buccinator, risorius, and zygomatic muscles. Higher scores indicate greater mobility. The P index indicates the ratio between the ICD in a resting position and the ICD during contraction of the orbicular muscle. Jansen et al. (7) report that interobserver variations are negligible and intraobserver variations are moderate on repeated measurements.

FDI questionnaire

All patients completed the questionnaire (10 items) comprising the FDI. The FDI is a disease-specific, self-reporting instrument developed by VanSwearingen and Brach (9) in 1996 for the assessment of patients with sequelae of facial paralysis. The FDI results in two indices: the level of physical disability (FDI-physical) and the level of social handicap (FDI-social). Both indices use a 100-point scale, with higher scores indicating less impairment and less handicap. Research performed by VanSwearingen and Brach (9) showed that the FDI subscales produce reliable and valid measurements in patients with sequelae of facial paralysis.

Hypothesis

Mime therapy results in improvement in patients with facial paralysis, indicated by a lower score on stiffness and a higher score on lip mobility, FDI-physical, and FDI-social indices.

RESULTS

Patients

Between April 1, 1999, and November 1, 2001, 162 patients were referred to the physiotherapy departments of two university medical centers. Of these 162 patients, 50 (21 men and 29 women, mean House-Brackmann Grade IV) met the inclusion criteria and consented (10). Reasons for not being included were that the patients were too young, had received nerve or muscle reconstruction after complete paralysis, or were referred earlier than 9 months after the onset of paralysis.

Twenty-five patients received mime therapy for 3 months, and the other 25 patients were on a waiting list for 3 months. Because waiting lists in Dutch health care are ubiquitous phenomena, patients accepted this waiting period.

Details of the patient groups are listed in Table 1. Groups did not differ significantly regarding gender, age, referral, cause and severity of paralysis, affected side, and the time interval between the paralysis and the referral. There were two dropouts, one in each group; reasons for dropping out were not related to the treatment.

TABLE 1. *Composition of patient groups*

	Waiting list	Mime therapy	Sig*
No.	25	25	NS
Gender	M, 10; F, 15	M, 11; F, 14	NS
Age, mean	43 (SD, 15; range, 20–73)	44 (SD, 14; range 20–66)	NS
Referred by			
General practitioner	3	3	NS
ENT specialist	19	19	
Plastic surgeon	1	3	
Neurologist	2	0	
Cause			
Bell	18	16	NS
Acustic neuroma	4	2	
Herpes zoster	2	3	
Lyme disease	1	0	
Trauma	0	3	
Operation trauma	0	1	
Severity of paralysis†			
House-Brackmann	4 (SD, 0.9; range, 2–5)	4 (SD, 0.8; range, 2–5)	NS
Time between onset and intake, mean	16 (SD, 9; range, 10–96; modus, 12)	16 (SD, 11; range, 10–480; modus, 12)	NS
Affected side	Right, 9; left, 16	Right, 13; left, 12	NS

*Significant difference ($p < 0.05$).
†Measured by the physiotherapist.
M, male; F, female; ENT, ear, nose, and throat; Sig, significant difference; NS, not significant; SD, standard deviation.

Analysis

The analysis was performed on the basis of data of 48 patients in several steps.

Analysis step 1: control of equivalence of groups at pretest

To check the results of the random assignment procedure, the mean scores of the experimental and the waiting list group were compared (two-sided *t* test). When the two groups did not show significant differences, they were considered to be equivalent.

Concerning stiffness, the comparison of the two groups at pretest showed that the mean scores did not differ significantly (*t* test, $p = 0.86$). For the LL index, this comparison of the two groups at pretest showed that the mean LL index scores did not differ significantly (*t* test, $p = 0.07$), similar results were found for the P index (*t* test, $p = 0.35$).

For both FDI indices (FDI-physical and FDI-social), the comparison of the two groups at pretest showed that both indices did not differ significantly (*t* test, $p = 0.24$ and $p = 0.37$, respectively). Table 2 lists the mean scores for all indices at pretest in both groups. The above-reported absence of significant differences between the treatment and the control groups does not depend on gender or age of the patients (analysis of variance, no significant interactions).

The results listed in Tables 1 and 2 support the assumption of the equivalence of the treatment and waiting list groups before treatment. This is a precondition for attributing an eventual difference at posttest to an effect of mime therapy.

TABLE 2. *Mean scores and standard deviation of stiffness, lip mobility, and Facial Disability Index at pretest and posttest for patients in the waiting list group and in the mime therapy group (n = 48)*

	Pretest mean (SD)			*Posttest mean (SD)*		
	WL	MT	Sig*	*WL*	*MT*	*p* value
Impairment level						
Stiffness	3.68 (0.75)	3.72 (0.84)	NS	*3.54 (0.66)*	*2.37 (0.71)*	<0.00
Lip mobility or immobility						
LL index	21.6 (8.4)	17.6 (6.7)	NS	*19.6 (7.7)*	*23.7 (7.3)*	<0.03
P index	16.3 (6.2)	14.7 (5.7)	NS	*15.7 (5.7)*	*21 (7.3)*	<0.00
Disability level						
FDI-physical	63.2 (17.9)	56.8 (20.7)	NS	*59.6 (17.8)*	*73.5 (16.8)*	<0.02
Participation level						
FDI-social	72.6 (17.3)	68.6 (14.1)	NS	*66.2 (16.4)*	*80.7 (12.2)*	<0.01

*Significant difference ($p < 0.05$), two-sided *t* test.
SD, standard deviation; FDI, Facial Disability Index; WL, waiting list; MT, mime therapy; Sig, significant difference; NS, not significant; LL, lip-length; P, pout.

Analysis step 2: determination of effects

To determine the effects of mime therapy, two substeps were performed: (a) the mean scores at posttest were inspected to evaluate whether the treatment group differed in the hypothesized direction from the mean scores in the waiting list group; (b) only when this condition is met does it make sense to use a statistical test to determine whether this difference is significantly different from zero (one-sided test). In the case of this condition not being met, the data would already contradict the hypothesis of a positive effect of mime therapy.

Analysis step 2a: control of data consistency with hypothesis

As can be seen from Table 2, all indices at posttest in the treatment group compared with the waiting list group show a difference that is consistent with the hypothesis of positive effects of mime therapy for patients with sequelae of facial paralysis (degree of stiffness is lower for the treatment group; the other three indices are higher).

Analysis step 2b: statistical analysis of posttest differences

To determine whether the observed differences at posttest are statistically significant, one-sided *t* tests were performed for each of the indices. The results are shown on the right side of Table 2. For all indices, patients in the treatment group score significantly more favorably compared with the waiting list group.

Analysis step 3: correction for interpatient differences

To evaluate the effects of the treatment more precisely at posttest, (i.e., without the blur evoked by preexisting interindividual differences), analyses of covariance were performed on all posttest indices, with the corresponding pretest score as a covariable. The results are listed in Table 3.

After statistical correction for preexisting differences, significant ($p < 0.05$) and substantial (Cohen's $d > 1.0$ (10,11)) effects of mime therapy on all outcome variables are listed in Table 3.

Patients also differ in gender and age. To assess the generalizability of the above results across gender and age, these variables were included as additional factors in the analysis of variance design. The age variable was trichotomized (< 35 years, 35–50 years, and > 50 years) and no significant interactions of gender by treatment or age by treatment were found. The effects of mime therapy apparently do not differ between the sexes or the three age groups.

TABLE 3. *Effects of mime therapy versus waiting list condition—Results of ANCOVA after correction for interpatients differences at pretest (n = 48)*

	*p**	Eta^2	Cohen's d
Impairment level			
Stiffness	<0.00	0.49	1.92
Lip mobility or immobility			
LL index	<0.00	0.69	2.78
P index	<0.00	0.60	2.50
Disability level			
FDI-physical	<0.00	0.64	2.35
Participation level			
FDI-social	<0.00	0.74	3.02

ANCOVA, analysis of covariance; LL, lip-length; P, pout; FDI, Facial Disability Index.

DISCUSSION

Patients with sequelae of facial paralysis who had received 10 weeks of mime therapy showed, in comparison to a randomized waiting list control group, significantly and substantially favorable scores on indices of facial stiffness, lip immobility, and the physical and social aspects of the FDI. Similar beneficial aspects of mime therapy were found in a retrospective study of 10-year archive data of 175 patients (12).

How do our results compare with other RCT studies on facial paralysis patients? A search in the English, French, and German literature (MEDLINE, CINAHL, PEDro, DocOnline, Excerpta Medica, and Cochrane) for the period 1975 to 2001 concerning physiotherapy in patients with sequelae after facial paralysis revealed only two reports of studies with an RCT design. These are discussed below.

Ross et al. (2) studied the efficacy of feedback training in 25 patients with facial paralysis in an RCT. They compared electromyographic feedback plus mirror versus mirror feedback alone. A third group used as a comparison group received no therapy. The designation "RCT" is based on the formation of the two treatment groups by random assignment. There was no significant difference between these two treatment groups on any of the outcome measures. We do not subscribe to the conclusion of Ross et al. that they have given proof that feedback training was efficacious, because their conclusion is based on the comparison of two treatment groups with a third group receiving no treatment, the latter group not being formed by random assignment. In our study, positive differences were found between the treatment and the control groups, with both being formed by a single random assignment procedure.

Segal et al. (3) reported an RCT comparing "standard" therapy with a new therapy ("small movement") intended to reduce synkinesis. They did not find significant differences in the outcome measures between groups, which consisted of a total of 10 patients with a history of facial paralysis of 5 months' duration or longer. The study of Segal et al. (3) also differs from ours in that they used a very small number of patients with a short history of facial paralysis. In our study, which includes 50 patients with a mean history of facial paralysis of 16 months, we found significant differences between the treatment and control groups in all four variables. Although reduction of synkineses was not one of these four outcome variables, better lip mobility and less stiffness could indicate inhibition of synkineses. Ongoing data

analysis in this mime therapy study will investigate this hypothesis.

Strength of the design

Positive effects of mime therapy were inferred from the existence of posttest differences between two randomly assigned groups. Patients in the treatment group directly entered (after the pretest) a 10-week treatment program. Patients in the control group (after the pretest) were told that the start of their treatment was scheduled for 3 months later. The random assignment procedure ensured that the groups were equivalent directly after assignment. The differences between the two groups at posttest can only be attributed to differences arising after assignment. Obviously, receiving mime therapy (or not) is one of the relevant differences, but are there other factors that are relevant?

Patients were not blinded as to whether they were on the waiting list or not and, because waiting lists in the Dutch health care system are ubiquitous, patients considered this normal. We have no indications that patients in the waiting list group felt disadvantaged, or that patients in the treatment group felt privileged. Stiffness and both FDI indices are based on patient report: at pretest, no significant differences between the groups were found. Physiotherapists performed the lip mobility measurements and were not blinded to the patient's group, as they had to make appointments for the next visit. The absence of group differences in lip mobility at pretest does not support the hypothesis of biased measurements. We assume that the therapist's knowledge regarding the patient's condition did not differentially influence the lip mobility measurements at posttest. In general, physiotherapists did not have access to the pretest data when collecting data at posttest.

Spontaneous recovery in the 3 months between pretest and posttest is the same in both groups, because the groups are formed by random assignment within patient pairs. Differential patient expectancies in both groups (part of a placebo effect) could be held responsible for (part of) the observed posttest differences. We consider such effects as part of the complex set of mechanisms called on by mime therapy. Theoretical work has to be carried out in conjunction with process studies to reveal which components underlie the positive effects.

In due time, information will become available on facial symmetry and synkinesis of the patients in this trial and at the 3- and 12- month follow-up. This information will be obtained by scoring videotaped facial performance, blinded as to treatment group and time of measurement.

CONCLUSION

This research shows that mime therapy has positive and substantial effects on four outcome variables corresponding to the World Health Organization's classification of functioning, impairment, and handicap. Physiotherapy (in particular, exercise therapy) when treating patients with sequelae of facial paralysis is not yet evidence based, and therefore this research could form a starting point for further development of rehabilitation for this group.

Given the substantial size of the effects, mime therapy seems to be an important treatment option for patients with sequelae of longstanding peripheral facial paralysis.

REFERENCES

1. Beurskens CHG, Oosterhof J, Elvers J, et al. The role of physical therapy in patients with facial paralysis: state of the art. *Eur Arch Otorhinolaryngol* 1994;Dec(Suppl):S125–6.
2. Ross B, Nedzelski JM, Mclean JA. Efficacy of feedback training in long-standing facial nerve paresis. *Laryngoscope* 1991;101: 744–50.
3. Segal B, Hunter T, Danys I, et al. Minimizing synkinesis during rehabilitation of the paralyzed face: preliminary assessment of a new small-movement therapy. *J Otolaryngol* 1995;24:149–53.
4. *ICIDH-2: International Classification of Functioning and Disability*. Beta-2 draft, full version. Geneva: World Health Organization, 1999.
5. Beurskens CHG, Burgers-Bots IAL, van Rossum-Herraets MEJ. Fysiotherapie bij een perifere facialisverlamming. In: Vaes P, Aufdemkampc G, den Dekker JB, et al, eds. *Jaarboek Fysiotherapie/Kinesitherapie*. Houten/Diegem: Bohn Stafleu van Loghum, 1997:98–116.
6. Devriese PP, Beurskens C, Heiningen van I. *Rehabilitation of Facial Expression by Mime*. Amsterdam: Huisdrukkerij AZUA, 1998.
7. Jansen C, Jennekens FGI, Wokke JHJ, et al. Lip-length and snout indices: methods for quantitative assessment of peri-oral facial muscle strength. *J Neurol Sci* 1990;97:133–42.
8. Jansen C, Devriese PP, Jennekens FGI, et al. Lip-length and snout indices in Bell's palsy. *Acta Otolaryngol* 1991;111:1065–9.
9. VanSwearingen JM, Brach JS. The Facial Disability Index: reliability and validity of a disability assessment instrument for disorders of the facial neuromuscular system. *Phys Ther* 1996;76: 1288–98.
10. House JW, Brackmann DE. Facial nerve grading system. *Otolaryngol Head Neck Surg* 1985;113:146–7.
11. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. New York: Academic Press, 1977.
12. Beurskens CHG. Mime therapy: rehabilitation of the facial expression. [*doctoral thesis*]. Nijmegen: University of Nijmegen, 2003.