# Counseling and Physical Therapy as Treatment for Myofascial Pain of the Masticatory System

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***Aims:*** *To prospectively evaluate the effectiveness of a treatment regimen comprising counseling and physical therapy in patients with myofascial pain of the masticatory system, and to explore whether the duration of the physical therapy offered (4 vs 6 weeks) would influence the treatment result.* ***Methods:*** *Twenty-six patients were randomly distributed over 2 groups. All patients received reassuring information, advice regarding relaxation of the jaws, avoiding parafunctions, and limited use of the jaws. In addition, a physical therapy program (heat application, massage, ultrasound and muscle stretching) was initiated 2 weeks after the start of the study (group I, receiving 4 weeks of physical therapy) or immediately from the start of the study (group II, receiving 6 weeks of physical therapy). The following parameters were taken at baseline, 2, 4, and 6 weeks: visual analog scale (VAS) scores of present pain; lowest and highest pain over the past period; percentage of pain relief; jaw function assessment by the Mandibular Function Impairment Questionnaire (MFIQ); and pressure pain thresholds (PPTs) of the masseter, temporalis, and thumb muscles. Statistical analysis used a linear mixed model and corrected for multiple testing (Tukey test).* ***Results:*** *Pain and MFIQ scores decreased while PPTs increased in both groups. Only after 4 and 6 weeks, significant differences were present for the PPT of the masseter in group I ($P < .02$) and the temporalis in both groups ($P < .01$). Also, the VAS scores of present ($P < .02$), minimal ($P < .01$), and maximal ($P < .0001$) pain and the MFIQ score ($P < .001$) improved. After 6 weeks, a mean of 60% pain decrease was reported ($P < .0001$). There were no significant differences between the groups receiving 4 weeks vs 6 weeks of physical therapy.* ***Conclusion:*** *A conservative approach involving counseling and physical therapy resulted in significant improvement in parameters of pain and jaw function in patients with myofascial pain. A controlled study will be necessary to elucidate the specific effectiveness of physical therapy over counseling or no treatment.*
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**Key words:** temporomandibular disorders, treatment, physical therapy

The etiology and management of pain and dysfunction of the masticatory system (collectively called temporomandibular disorders or TMD), have been the subject of debate for many decades. A wide range of treatments has been described and advocated—medication, physical therapy,[1] occlusal splints,[2] occlusal adjustment, surgical approaches—and all have been reported successful to a certain extent.[3] Since longitudinal studies illustrated the benign evolution of TMD,[4] low-tech and reversible treatments are preferred over a more aggressive irreversible

approach. Futhermore, most studies on the effectiveness of particular treatment regimens have suffered from *(1)* the lack of clear inclusion criteria and homogeneous test groups, *(2)* the lack of clear criteria for the definition of treatment success, and *(3)* a randomized and controlled design.

Since the introduction of the Research Diagnostic Criteria for TMD (RDC/TMD),[5] clear distinctions can be made within the group of patients suffering from TMD, and since then, research on etiology and management has focused on more precise subdiagnoses (eg, myofascial pain of the masticatory system, internal derangements of the temporomandibular joint [TMJ], osteoarthritis of the TMJ).[6]

In regard to the use of physical therapy for the management of myofascial pain in general, a recent review has indicated that receiving physical treatment was better than no treatment, while most therapies were shown to be no more efficacious than placebo.[7]

Even if still semi-subjective, since they are based on the patient's report, the introduction of the visual analog scale (VAS), the use of algometry (pressure pain thresholds [PPT]) for pain measurement, and the Mandibular Function Impairment Questionnaire (MFIQ) for the evaluation of jaw function,[8] have substantially improved the evaluation of outcome. These instruments proved to be reliable and reproducible,[8,9] and recently, also the clinical validity, expressed as the smallest detectable difference (SDD), has been documented for 1 of the subgroups of TMD patients (ie, anterior disc displacement without reduction).[10]

With these developments in mind, the aim of the present study was to evaluate prospectively the effectiveness of a treatment regimen involving counseling and physical therapy in a homogeneous group of patients with myofascial pain of the masticatory system, and to explore whether the duration of the physical therapy offered (4 vs 6 weeks) would influence the treatment results. Part of this paper has been published as an abstract.[11]

## Materials and Methods

### Patients

Out of 84 new patients presenting over a 2-month period at the Clinic for Temporomandibular Disorders, School of Dentistry, K.U. Leuven, a trained investigator (ADL) selected 40 subjects based upon the following inclusion criteria (RDC/TMD Group Ia):

- Dull regional pain in the face persisting more than 1 month
- Muscles tender to palpation, and recognizable pain which increased by palpation

Exclusion criteria were:

- Anterior disc displacement without reduction (RDC/TMD Groups IIb and IIc)
- Pure arthrogenic pain (RDC/TMD Group IIIa)
- Atypical facial pain, atypical odontalgia

Subjects were not excluded if they had a clicking joint (anterior disc displacement with reduction, RDC/TMD Group IIa), provided that the clicking joint was not accompanied by capsular pain or pain during clicking. Periodic clicking sounds during mandibular function have been reported in up to 50% of a nonpatient population.[12]

Twenty-six patients agreed to participate after informed consent. The Local Ethical Committee approved the study. The patients were randomly assigned to 2 groups. In group I, 2 male patients (age 44 and 54 years) and 11 female patients (mean age 42 years, range 16 to 66 years) participated. Group II consisted also of 2 male patients (age 24 and 60 years) and 11 females (mean age 43 years, range 24 to 62 years). Measurement sessions were scheduled at the time of intake, and after 2, 4, and 6 weeks of treatment.

### Treatment Regimen

All patients received extensive information on the presumed etiology of their pain, reassurance of its benign character, as well as verbal and written instructions on how to relax their jaw muscles and how to use their jaw system. This approach will be called "counseling" hereafter, and the instructions are summarized in Table 1. In addition, all the patients received physical therapy. To explore the influence of the duration of the physical therapy, the patients in group I started their therapy after 2 weeks, thus receiving 4 weeks of physiotherapy, while the patients in group II received the combination of counseling and physical therapy from the start of the study.

The physical therapy procedure was extensively explained to all physiotherapists involved, most of whom had previous experience with the treatment of TMD. Written instructions (Table 2) were provided in an attempt to calibrate the treatment as much as possible, and a telephone follow-up to the physiotherapists assured that they understood and followed these instructions. Indeed, due to the

**Table 1** Instructions Provided to All Subjects

| |
|---|
| 1. When the jaw is at rest, your teeth should never touch. The teeth only touch while swallowing or eating. |
| 2. Avoid cold wind or outside temperatures, too many or extreme movements of the jaw, parafunctions like clenching or grinding, biting nails or pencils, leaning on your jaw. |
| 3. Try to eat soft food slowly, in small pieces. |
| 4. Use some kind of reminder to become aware of parafunctions and try to change them in a non-jaw–related habit. |

**Table 2** Instructions for the Physical Therapists

| |
|---|
| 1. Provide continuous (not pulsed) ultrasound therapy for 5 minutes, using a muscle gel (Flex–Free-R). |
| 2. Massage the masseter and temporalis muscles for 10 minutes. |
| 3. Stretch the masseter muscle in short series, and teach this to the patient (5 minutes). |
| 4. Repeat massage for 5 minutes. |
| 5. Instruct the patient to automassage 2 times per day and apply a warm pad for 20 minutes in the evening. |
| 6. Reinforce the awareness of parafunctions and habit reversal to the patient. |

geographical spread of the patients, it was necessary to find a treating physiotherapist in the patients' neighborhoods.

The patients were treated 3 times per week, for 6 weeks (group II) or 4 weeks (Group I). Care was taken to plan the treatment schedule according to the research protocol, so that for group II, the physiotherapy started within 2 days after the start of the study, and for group I at least 2 weeks after the start of the study.

### Measurement Sessions

Before the start of the treatment and after 2, 4, and 6 weeks, an investigator (SP), who was blind for the grouping of the patients and not involved in the screening procedure or the physiotherapy, collected data on 3 kinds of measurements: (a) PPTs, (b) pain report scored on a VAS and percentage pain relief, and (c) jaw function assessed by the MFIQ.[8]

**Pressure Pain Threshold.** The PPTs were measured with a custom-made algometer.[13] The tip-size area was 0.5 $cm^2$ and the application rate was 40 kPa/s. The PPTs were taken at trigeminal sites (the bilateral temporal and masseteric muscles) and a nontrigeminal site (the left thumb eminence) as a reference. During the measurements, the subjects were seated upright in a dental chair. While the patients were clenching, the most bulky parts of the masseter and anterior temporalis muscles were chosen by palpation and marked on the skin. These spots were also copied on a deformable plastic template, together with some facial reference points, which enabled the measurement areas to be reproduced during the subsequent sessions. During the PPT measurements, the subjects were instructed to keep the jaw muscles relaxed. They signalled the PPT by pressing a button, at which point the pressure was stopped.

At the start of each session, the subjects were familiarized with the measurement procedure and the equipment, through a demonstration on the right forearm. The PPT was defined as "the point at which a sensation of pressure changes into a sensation of pain." The latter was repeated at the beginning of each session to avoid confusion with pain tolerance.

After a relaxation period of 1 minute, the PPTs of the muscle sites were measured in the following sequence, with intervals of a few seconds between sites: left temporalis, left masseter, left thumb, right masseter, and right temporalis. After a few minutes, the entire procedure was repeated with the sequence: right temporalis, right masseter, left thumb, left masseter, and left temporalis.

**Subjective Evaluation of the Pain.** *Visual Analog Scales.* To record the present intensity of pain, and the minimal and maximal amount of pain in the previous 2 weeks, a horizontal VAS of 10 cm in length was used, which was anchored by the words "no pain" and "most imaginable pain." To test the internal consistency of the patients' reports, a sheet of grey paper was shown, and patients had to score the intensity of the color on a VAS anchored by "white" and "black."[2]

*Percentage Pain Relief.* In addition to the VAS, patients were asked at every measurement session how much relief they experienced in comparison with the start of the trial; an equal amount of pain was scored 0%.

**Mandibular Function Impairment Questionnaire (MFIQ).** The MFIQ scores the TMD-related impairment of normal activities and functions of the masticatory system based on 17 questions.[8] It has been proven to be a reliable instrument, illustrating the "quality of life" regarding the use of the jaw system. The questions indicate how much a particular activity is hampered by the TMD and are answered on a 0 to 4 Likert scale (0 = not at all, 4 = very much), with a maximum score of 68.

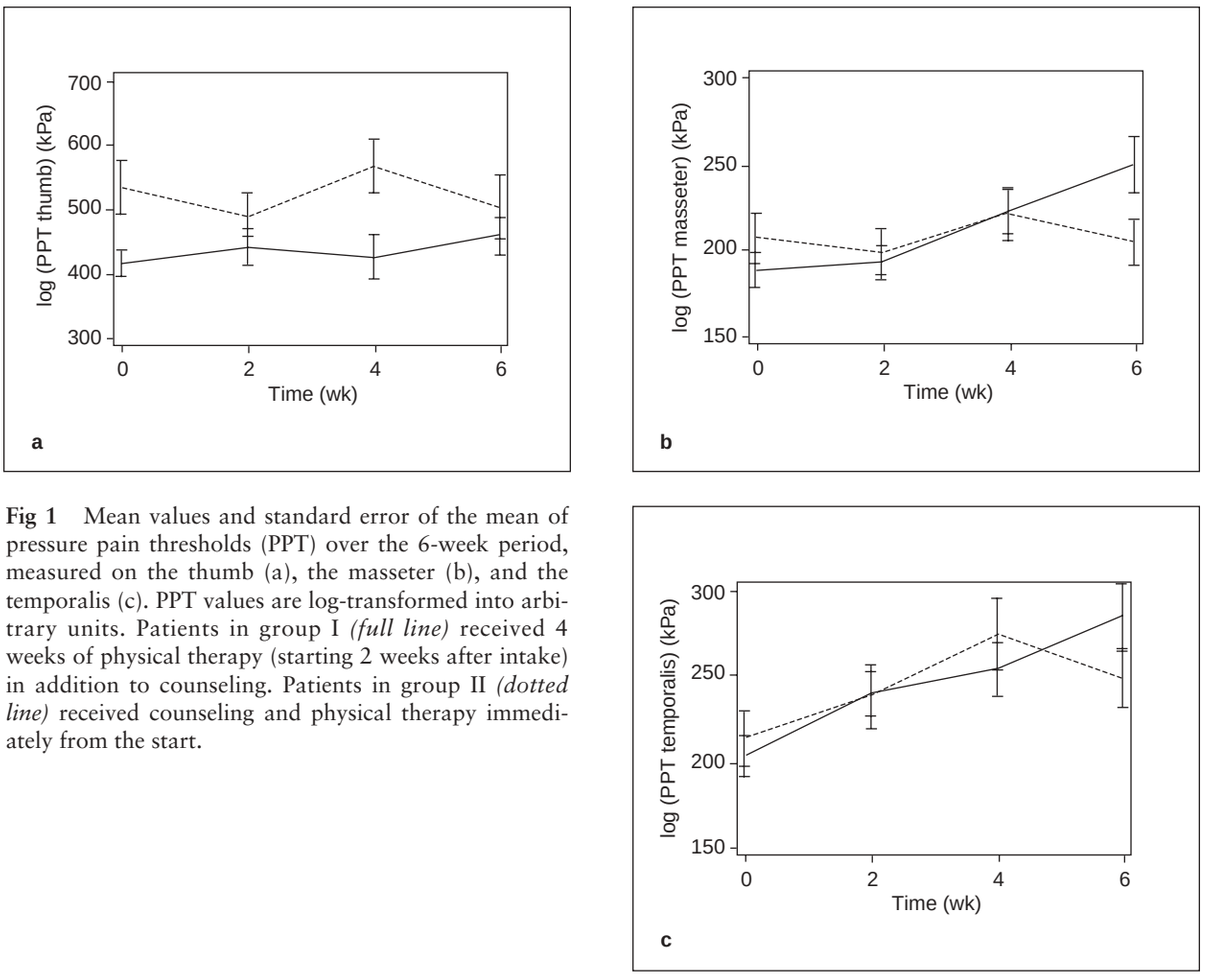


**Fig 1** Mean values and standard error of the mean of pressure pain thresholds (PPT) over the 6-week period, measured on the thumb (a), the masseter (b), and the temporalis (c). PPT values are log-transformed into arbitrary units. Patients in group I *(full line)* received 4 weeks of physical therapy (starting 2 weeks after intake) in addition to counseling. Patients in group II *(dotted line)* received counseling and physical therapy immediately from the start.

### Statistical Analysis

The PPTs, VAS scores, and the MFIQ score were analyzed by a linear mixed model,[14] which allows correction for the fact that measurements taken in the same individual are not independent from each other. Because of the spread of the data, the PPT measurements were logarithmically transformed before the analysis. Where appropriate, the *P* values were corrected for multiple testing by Tukey method.[15] The internal consistency of the patients' reports (grey test) was checked by the intraclass correlation coefficient (ICC).[16,17] All analyses were performed with SAS, version 6.12 (SAS Institute, Cary, NC). The level of significance was set at $P < .05$.

## Results

In the course of the study, 4 patients from group II dropped out. The analysis therefore was performed on 13 patients of group I and 9 patients of group II.

### Pressure Pain Thresholds

Figure 1 illustrates the PPTs measured at the masseter, the temporalis, and the thumb over the 6-week period. The PPTs measured at intake were not significantly different between groups II and I for the massester (group II: 207 ± 142 kPa, group I: 189 ± 10 kPa, $P = .6751$) and the temporalis (group II: 214 ± 16 kPa, group I: 204 ± 12 kPa, $P = .8352$) muscles. A similar situation was present after 2, 4, and 6 weeks; no statistically significant differences could be demonstrated between groups for any of the test sites (*P* values ranged from .2074 to .9978).

Considering the 6-week time period, both groups showed increasing PPT values over time. This global time effect was significant for the temporalis muscle in both groups (204 vs 284 kPa, $P = .0065$ for group I, and 214 vs 248 kPa, $P = .0082$ for group II), and for the masseter muscle in group I (189 to 250 kPa, $P = .0051$, group II: 207 vs 205 kPa, $P = .2656$). When the measurement sessions

after 2, 4, and 6 weeks were compared separately with the values recorded at intake, the PPT increase reached a significant level only in group I for the temporalis muscle after 4 weeks ($P$ = .0456) and for both masseter ($P$ = .0164) and temporalis ($P$ = .0255) muscles after 6 weeks. No such differences were observed in group II.

Statistical analysis did not show differences between the first and second measurement of each session on the masseter ($P$ = .2729) or the temporalis ($P$ = .2728).

No significant differences were observed between the painful and nonpainful side regarding the PPT of the masseter ($P$ = .2382) or the temporalis ($P$ = .2875) muscles.

At the control site (thumb), no statistically significant differences could be shown between measurements of a session ($P$ = .0899), between groups ($P$ = .1424), or over time ($P$ = .9433).

### Subjective Evaluation of the Pain

**Internal Consistency–Grey Scale.** The intraclass correlation for the VAS ratings of the grey intensity was 0.60 (confidence interval: 0.42 to 0.79), indicating a fair to good reliability. Consequently, the use of VAS scales by the patients as a technique to measure their pain could be considered acceptable.

**VAS for Pain Intensity and Percentage Pain Relief.** At the start of the study, no significant difference could be observed between groups I and II regarding present pain ($P$ = .1089), minimum pain ($P$ = .3463), or maximum pain ($P$ = .8072) over the past 2 weeks.

Over the 6-week treatment period, the VAS scores dropped significantly ($P$ < .0001): for present pain, from 2.75 to 2.0 cm (group I) and 1.83 to 0.79 cm (group II); for minimum pain, from 1.18 to 0.71 cm (group I) and 0.69 to 0.48 cm (group II); and for maximum pain, from 6.78 to 3.79 cm (group I) and 6.54 to 4.65 cm (group II). Percentage pain relief was reported as 61% (group I) and 57% (group II). These effects over time for present pain ($P$ = .9967), minimum pain ($P$ = .5615), and maximum pain ($P$ = .3554) over the past 2 weeks, and percentage pain relief ($P$ = .4828) were, however, not significantly different between groups I and II (Fig 2).

### Mandibular Function Impairment Questionnaire

The mean value for the MFIQ was 19 for both groups at intake. After 6 weeks, this value decreased to 12 (group I) and 11 (group II). The time course of the change over the different time periods (2-4-6 weeks) was not significantly different between groups I and II ($P$ = .3354). When the total amount of change was compared between the groups, no significant difference was shown ($P$ = .8014), while both improved significantly over time ($P$ = .0001) (Fig 2).

## Discussion

The main goals for every treatment of chronic pain are pain reduction and improvement in the quality of life. Studies of treatment effectiveness therefore should score the decrease of the pain and the contribution of the treatment to a better quality of life. In the present study, on the effectiveness of physical therapy and counseling, pain reduction was scored through the use of PPTs, VAS, and percentage pain relief. The influence of the myofascial pain on the quality of life was evaluated by the MFIQ.

### Reduction of Pain

After 2 weeks, no significant differences were observed between the 2 groups. This was the only point where eventually a difference between "counseling only" and "counseling and physical therapy" could have been found. In view of the chronic pain state, however, 2 weeks is too short a period to evaluate the treatment outcome. After 6 weeks, no significant differences were observed between the 2 groups, indicating that there was no extra pain relief in the group receiving physical therapy for 6 weeks as compared to 4 weeks. However, the patients of both groups reported a significant decrease in pain intensity, as seen in the VAS scores and the percentage pain relief.

In a recent study,[10] Kropmans et al calculated the smallest detectable difference (SDD) on a VAS scale to be considered clinically relevant, for a group of TMD patients suffering from anterior disc displacement without reduction. The VAS scale was identical to the one used in the present study. For present pain, minimal, and maximal pain, a VAS decrease of 28, 22, and 22 mm, respectively, was necessary to conclude therapeutic effectiveness. If these findings could be transposed to the present population of myofascial pain patients, the decrease of "maximal pain" (20 to 30 mm) and for percentage pain relief (57% to 61%) could be considered clinically relevant. The subjective improvement was also associated with a significant increase in PPT for the masseter and temporalis muscles in group I.

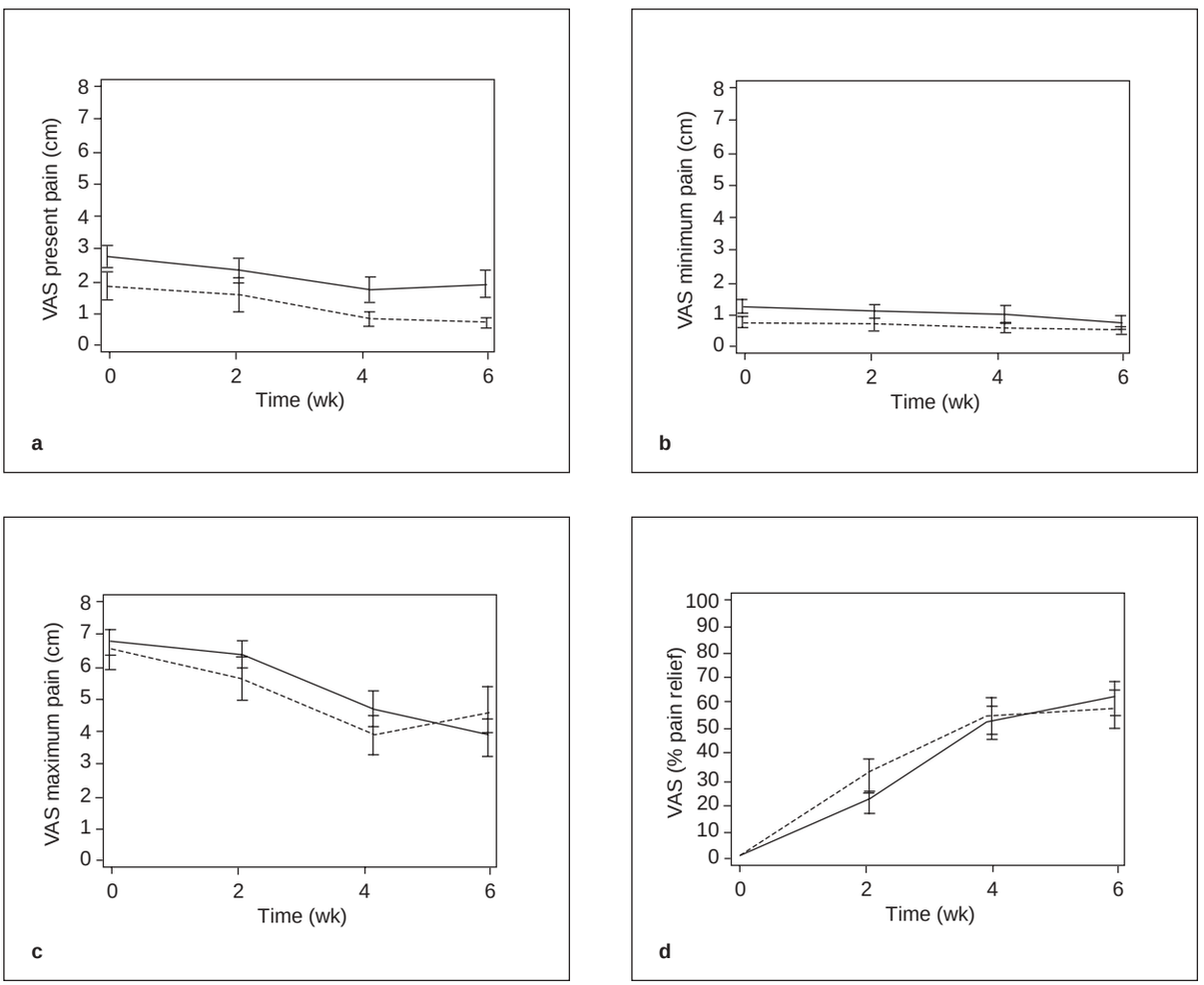


**Fig 2** Mean values and standard error of the mean of the visual analog scale (VAS) ratings for present pain (a), minimum pain (b), and maximum pain (c) over the last period, the percentage pain relief (d) and the score of the Mandibular Function Impairment Questionnaire, MFIQ (e).

Whereas previous research has already confirmed the reproducibility of algometry,[8,18] it was striking to see that the PPTs did not differ between the painful and nonpainful sides in both groups, which could question the validity of the measuring instrument. This lack of difference between sides could be due to central sensitization[19–21] and/or central modulation of pain thresholds.[22] This might explain why a nonpainful side is not reported as such, but appears equally sensitive to pressure stimuli and also improves parallel to the nonpainful side.

### Evaluation of the Quality of Life

The MFIQ scores did not improve during the first 2 weeks and also did not differ between the groups at the 2-week follow-up. However, the scores were significantly increased in both groups at the 4- and 6-week follow-up, illustrating a better quality of life regarding masticatory function. Again no differences were observed between groups. Referring to the SDD, a minimum decrease of 8 points on the MFIQ is necessary to consider the improvement clinically relevant. This score was reached only after 6 weeks for both groups. Again, no difference was noted in relation to the duration of the physical therapy.

The use of physical therapy (ultrasound, exercises, application of heat, stretching techniques) has gained increasing interest in the treatment of masticatory myofascial pain, but the rationale for it was almost always based on empirical findings only.[23] Systematic evaluation of therapeutic effectiveness has been scarce, because these modalities are commonly used in addition to other treatment. In general, it is assumed that physical therapy has a positive effect on symptoms of TMD, but controlled trials are lacking.[24,25] The present study could only confirm that a combination of counseling and physical therapy resulted in a clinically relevant improvement. The design did not permit comparison of the effectiveness of physical therapy over counseling (except for the first 2 weeks, where no differences were seen). For this comparison, a controlled randomized study is needed.

In a recent review,[7] Feine and Lund suggested that the amount of treatment offered (number of visits with treating physical therapist) could influence the report of pain. Since in group II patients had 18 visits of 30 minutes with the physical therapist, while group I patients had only 12 such visits, the present findings could not confirm this suggestion.

Of course, one could suggest that the modalities used in the present study during the physical therapy sessions were not appropriate for this kind of pain, and that future studies should also evaluate the use of new concepts and techniques (eg, mobilization of the peripheral neuronal system,[26] postural training), which, however, also are poorly documented.

After 4 and 6 weeks of combined treatment for myofascial pain, a marked improvement was reported in both groups, confirming the effectiveness of conservative management of masticatory myofascial pain.[27] The present study design, however, did not allow an evaluation of the additional value of physical therapy over counseling over longer time periods. To answer this question, a longer-term controlled trial will be needed.

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