



The Interrelationship between Dentistry and Physiotherapy in the Treatment of Temporomandibular Disorders

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ABSTRACT

Aim: This study aimed to compare the effectiveness of interdisciplinary work between dentistry and physiotherapy as well as to determine the temporomandibular disorders (TMD) patients' treatment plan.

Materials and methods: The sample consisted of 300 patient records from the ATM service (Faculty of Dentistry, Federal University of Juiz de Fora) file. Three factors were analyzed: (1) Therapy, which were transcribed physical therapy modalities used; 2) If there were any guidelines or procedures for home exercises without the professionals presence; 3) the temporomandibular joint (TMJ) palpation pain rates, transferred to a pain level measurements table according to visual analog scale (VAS). The Chi-square test was applied for statistical analysis with a significance level $p \leq 0.05$.

Results: All physiotherapy modalities used separately or mixed contributed to TMJ pain relief. Guidelines for physical therapy at home proved to be very useful to pain decreasing.

Conclusion: It was concluded that the effectiveness of an interdisciplinary work in dentistry and physiotherapy treatments for TMD has been properly verified. It is essential to have an interdisciplinary treatment plan, where the physical therapy helps the pain relief and dentistry treats the disorders related to the stomatognathic system.

Clinical significance: The interdisciplinary work between dentistry and physiotherapy is more effective in TMD treatment.

Keywords: Temporomandibular joint, Temporomandibular disorder, Physiotherapy, Dentistry.

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INTRODUCTION

The temporomandibular joint (TMJ) is part of the stomatognathic system, presenting a close relationship with the skull bones, jaw, hyoid bone, cervical spine, collar bone,

teeth, head and neck masticatory system muscles, lymphatic and nervous system and head soft tissues.¹

Temporomandibular disorders (TMD) are related to TMJ and musculoskeletal system structures, which have occlusal disharmony, stress and hyperactivity of the masticatory muscles and neck as etiological factors.² TMD signs and symptoms occur, when the structural tolerance of the stomatognathic system is exceeded.³ The main signs and symptoms are ear ache without infection, TMJ pain during speech or chewing, mouth opening or closing difficult, face muscles fatigue, jaw movement dysfunctions in the joints and sounds as clicks and/or crackles.⁴

As a conservative treatment, physical therapy is being increasingly recognized as an important treatment because it has been long used for musculoskeletal disorders treatment as they cause pain and muscle spasms reducing, mobility and muscle strength improving.⁵

The integrated operation between the dentist and the physiotherapist helps in early diagnosis and improves the therapeutic interventions effectiveness. This impacts in science advance and sustainable regional development, since present viable solutions that improve the living conditions of the population.⁶

This study aimed to verify the efficacy of interdisciplinary work between dentistry and physiotherapy, and head the right treatment plan for TMD patients.

MATERIALS AND METHODS

The study was approved by human research ethics committee of Federal University of Juiz de Fora under the protocol number 866.172.2006. The sample was obtained through direct access to 3,160 patient records from ATM Service of Faculty of Dentistry of Federal University of Juiz de Fora file, in the period between 2007 and 2010. As inclusion criteria, the patients should have at the time of

treatment beginning, at least: Three different TMD signals and symptoms, definitive TMD diagnosis, occlusal splints wearing, definitive treatment plan including physical therapy. Since they fit the inclusion criteria, 300 records were selected for the sample.

The physiotherapy treatment types that can be used to TMD pain relief were grouped into three different modalities, according to their common characteristics: (1) Physical therapy exercises: Kinesiotherapy, massage therapy and PGR, (2) electrotherapy: TENS microcurrent and laser therapy, (3) thermal agents, cryotherapy and thermotherapy.

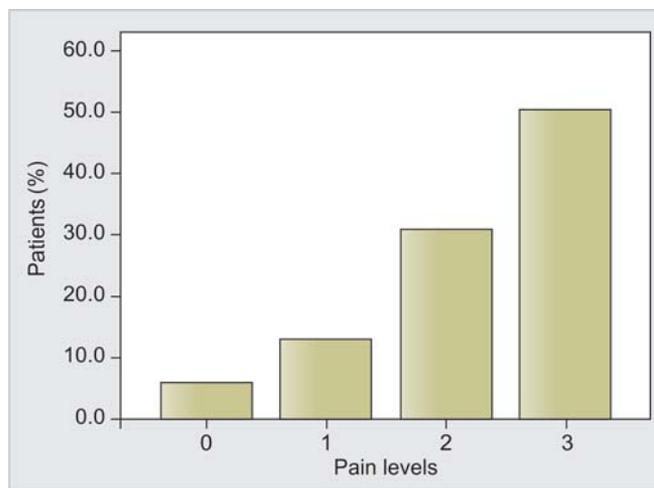
Each study record data was transferred to a questionnaire (Questionnaire 1). Three parameters were considered: (1) The therapy, which were transcribed physical therapy modalities used; (2) whether there was procedural guidelines for home exercises without professionals presence; (3) TMJ palpation pain rates, transferred to a pain level measurements table according to visual analog scale (VAS). The VAS values were divided into four categories: No pain or grade zero (zero VAS), low pain level or grade one (one to three VAS), moderate pain level or grade two (four to seven VAS) and high pain level or grade three (eight to ten VAS).

Data were grouped into frequency tables for further analysis using SPSS® 17 software, to ascertain the sample significance. The Chi-square test was selected for statistical analysis, considering $p \leq 0.05$.

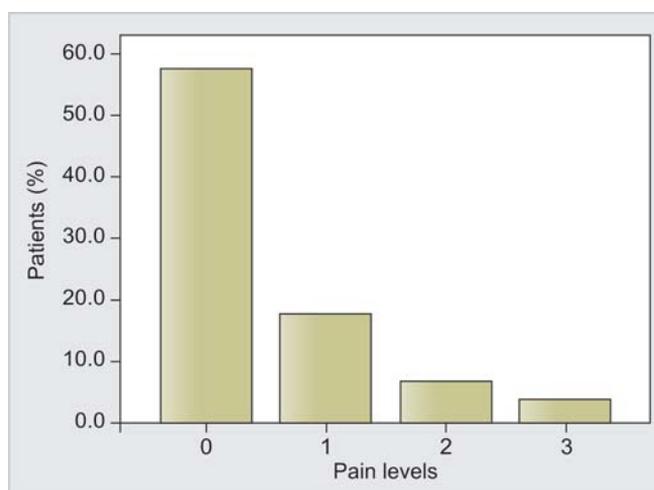
RESULTS

Initial palpation pain analysis showed that 151 patients (50.3%) had high pain level or grade III, 92 (30.7%) had moderate pain level or grade II, 39 (13%) with low pain level or grade I and 18 (6%) with no pain or grade 0. Considering the final palpation pain 13 patients (4.3%) had grade III, 22 (7.3%) grade II, 63 (21 %) grade I and 202 (67.3%) without pain. The results are displayed in Table 1, Graphs 1 and 2. Chi-square analysis showed that an interdisciplinary treatment between dentistry and physiotherapy is effective in TMD pain relief ($p = 0.014$).

As for physiotherapy modalities, 118 (39.3%) were treated with physical therapy exercises, among them 48 patients (16%) with only electrotherapies and 28 patients (9.3%)



Graph 1: Initial palpation pain levels



Graph 2: Final palpation pain levels

only with thermal agents. Fifty-nine patients (19.7%) were treated with physical therapy exercises and electrotherapy, 17 patients (5.7%) with physiotherapy exercises and thermal agents, 14 patients (4.7%) with thermal agents and electrotherapy and 16 patients (5.3%) were treated with all three modalities. The results are displayed in Table 2. Comparing the methods used in physical therapy patients with their respective palpation pain levels, it was possible to infer that:

- Among patients treated with physiotherapy exercises none had final pain level grade III, 6.8% had grade II, 24.6% with grade I and 68.6% grade 0.

Table 1: Relationship between initial palpation pain levels and final palpation pain levels

Initial pain/ final pain	0	1	2	3	Total	Percentage
0	15	1	1	1	18	6.0
1	28	8	1	2	39	13.0
2	73	12	5	2	92	30.7
3	86	42	15	8	151	50.3
Total	202	63	22	13	300	100
Percentual (%)	67.3	21	7.3	4.3	100	

Table 2: Relationship between physical therapy modalities performed and final palpation pain rates

Modalities/final pain	0	1	2	3	Total	Percentual (%)
Exercises	81	29	8	0	118	39.3
Electrotherapy	24	12	7	5	48	16.0
Thermic agents	11	9	2	6	28	9.3
Exercises and electrotherapy	49	6	2	2	59	19.7
Exercises and thermic agents	17	0	0	0	17	5.7
Electrotherapy and thermic agents	04	7	3	0	14	4.7
All methods	16	0	0	0	16	5.3
Total	202	63	22	13	300	100
Percentual (%)	63.3	21.0	7.3	4.3	100	

- Among patients treated with electrotherapy 10.4% had final pain level grade III, 14.6% with grade II, 25% grade I and 50% with grade 0.
- Among patients treated with thermal agents, 21.4% had final pain level grade III, 7.1% with grade II, 32.1% with grade I and 39.3% grade 0.
- Among patients treated with physiotherapy exercises and electrotherapy 3.4% had final pain level grade III, 3.4% with grade II, 10.2% with grade I and 83.1% with final pain grade 0.
- Among patients treated with physiotherapy exercises and thermal agents all (100%) had final pain level grade 0.
- Among patients treated with electrotherapy and thermal agents, none had final pain level grade III, 21.4% had grade II, 50% final pain level grade I and 28.6% with grade 0.
- Among patients treated with all three modalities, all (100%) presented final pain level grade 0.

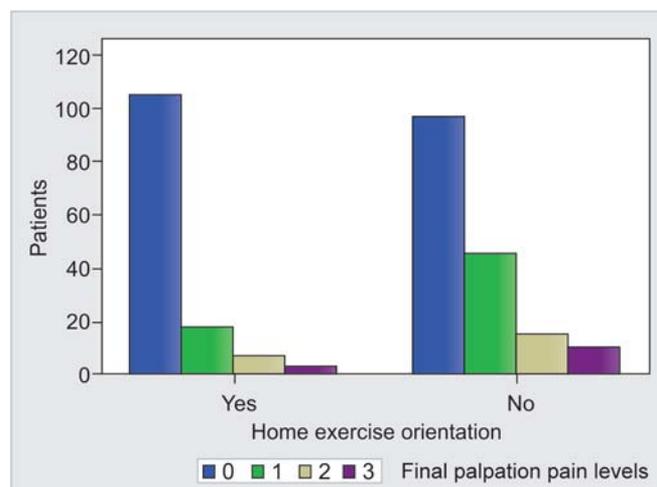
Statistical analysis of these comparisons, the Chi-square, allowed the observation that all physical therapy modalities used, alone or mixed, contributed to TMD pain relief. The results are available in Table 3.

Related to the guidelines for physical therapy without professional presence, 133 patients (44.3%) were instructed

Table 3: Results of Chi-square test between the physical therapy modalities performed and the final palpation pain rates

Modalities	Final pain p-value
Exercises	0.021
Electrotherapy	0.008
Thermic agents	0.001
Exercises and electrotherapy	0.037
Exercises and thermic agents	0.033
Electrotherapy and thermic agents	0.003
All methods	0.043

to such procedures and physiotherapy, and 167 patients (55.7%) received no guidance, as shown in Table 4. Relating patients who were advised to treatment without the professional presence as well as those not receiving this guidance with the final palpation pain levels (Graph 3). The Chi-square test was used for statistical analysis and it was found out that physiotherapy procedures performed without the presence of professional for TMD treatment are very useful in pain relief ($p = 0.002$).



Graph 3: Patients oriented or not to self-treatment in relation to the number of patients treated with their respective final population pain levels

DISCUSSION

Pain is a subjective and personal experience influenced by cultural learning, the meaning of the situation and several psychological variables.⁷ Besides pain, patients frequently have limited or asymmetric mandibular movements, joint sounds, masticatory muscle hypertrophy, parafunctional

Table 4: Relationship between the home exercises presence and final palpation pain rates

Home exercise orientation/final pain	0	1	2	3	Total	Percentual (%)
Yes	105	18	7	3	133	44.3
No	97	45	15	10	167	55.7
Total	202	63	22	13	300	100
Percentual (%)	67.3	21.0	7.3	4.3	100	

movements of the jaw as clenching or bruxism.⁸ The records of the patients surveyed that skeletal factors, occlusal parafunctional, psychological and inadequate postural exercises to the face musculature perpetuate TMD pain.²

The discomfort degree of the structure is important for patient's pain recognition and also can be an excellent method for treatment effects evaluating, beyond the attempt to identify the affected muscles, are also classified by pain degree in each patient.¹ The palpation pain diagnosis had a great relevance in this work, since only patients diagnosed with TMD had their records used in the study, which corroborates with Melo.⁹

VAS is a scale that measures the pain intensity, permitting a comparison of the pain levels percentage between groups.⁷ The VAS chart was used in this work, providing efficient results register.

The occlusal stabilization appliance has been used since the beginning of the century to pain relief and muscle repositioning in TMD. It is considered a great adjunct in the different disorders and bruxism treatment.¹⁰ While occlusal stabilization appliance is installed, it will be adjusted and the muscles will be in a more harmonious position.¹¹ But, the occlusal stabilization appliance benefits are dubious in controlling symptoms and treatment of TMD, due to its multifactorial characteristics, the most accepted hypotheses to explain occlusal stabilization appliance efficiency are the changes produced in proprioception, occlusion, vertical dimension as well as possible placebo effect.¹² The occlusal stabilization appliance prescription is designed mainly to simulate an ideal occlusion and improve the condyle/disk relationship, allowing for decompression of the whole region and the involved structures, often restoring the joint space, protecting the patient's teeth in bruxism and relieving pain.¹³ In this work, the occlusal stabilization appliance has been successfully employed in pain relieving.

It was also observed that approximately 85% of patients had pain symptoms relief (partial or total), after an interdisciplinary treatment for TMD between dentistry and physiotherapy, confirming the results of Nicolakis¹⁴ and Oh.¹⁵ However, similar results were found in studies where it was used only physiotherapy modalities.^{16,17} According to Carmeli¹⁸ findings, if a treatment is done with only one of the modalities, physical therapy seems to be more effective in TMD pain relieving.

The physiotherapy exercises effectiveness in TMD pain relief has been properly verified in the present study, corroborating the study of Zamperini.⁴ The exercises were the most prominent and kinesiotherapy RPG®. Thus, postural assessment could be an important component in

the overall approach to provide more accurate methods of prevention and TMD patient's treatment.¹⁹

The test for home exercise effectiveness measurement is weak due to very limited number of studies in literature, but this approach may be promising, especially if it is individualized.²⁰ In this study, the guidelines given to patients to perform exercises at home proved to be very effective as a form of adjunctive therapy in TMD treatment, but it was not possible to have knowledge of the exercises proposed by the physiotherapist to the patient, as there was not a detailed description of these guidelines in the searched records.

The electrical therapy proved to be of great help in pain relieving in TMD patients, confirming the results of Grossi² and Pedro Netto.²¹ The electrical therapy most prominent in this research were the TENS and laser therapy, but Pedro Netto²¹ pointed out that while laser therapy is a noninvasive method that accelerates collagen synthesis, increases vascular tissue, decreases the number of microorganisms and decreases pain, further studies are required for its application in TMD, especially with randomized clinical controls, which can assess the efficacy of different dosages and clinical protocols. Almagro¹⁶ recommended that the microcurrent only apply for an early treatment to eliminate or reduce pain. This work also observed the use of electrotherapy using microcurrent but in a reduced form.

Thermotherapy with ultrasound use was the thermal agent of greater emphasis in this research, showing great efficiency in fighting cases of orofacial pain in TMD, corroborating with Grossi² and Barão.¹

CONCLUSION

The effectiveness of an interdisciplinary work between dentistry and physiotherapy for TMD treatment has been properly verified, and it is essential to have an interdisciplinary treatment plan where the physical therapy helps in pain relief and dentistry treats the disorders related to the stomatognathic system beyond helps in pain relief.

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