ORIGINAL ARTICLE

IJPHY

Effectiveness of Physiotherapy Treatment For Temporomandibular Hyperlaxity. Case Report

*[1]Zacarías Sánchez Milá
[1]Jorge Velázquez Saornil
[1]Elena Sánchez Jiménez
[1]Alicia López González
[1]Angélica Campón Chekroun
[1]Encarnación Méndez Sánchez
[1]Sonia Gómez Sánchez
[1]Ana Martín Jiménez

ABSTRACT

Background: temporomandibular dysfunctions (TMD) are considered a collection of pathologies that involve bitting muscles, temporomandibular articulation, and associated bone structures.

Case Summary: 21-year-old female, suffering from temporomandibular joint pain and joint sounds during jaw movements. A 14-day treatment plan was carried out in which manual therapy was performed on day seven and day 14, together with a home training plan every day. When comparing the data obtained, significant results were found for joint range, increased muscle strength, and increased pain. At the same time, non-significant results were obtained in terms of decreased range in mandibular opening and protrusion movements. In addition, the increased pressure sensation at the joint in this case report.

Outcome Measures: A tape measure was used in the joint assessment, together with a pressure algometer to quantify pain and the Daniels scale in the muscle assessment.

Conclusion: Therefore, this study confirms that manual therapy and a home-training schedule reduce pain and increase movement control over temporomandibular articulation.

Keywords: temporomandibular disorder; joint laxities; manual therapy; physical therapy; myofascial pain dysfunction syndrome; temporomandibular joint.

Received 03rd July 2021, accepted 05th August 2021, published 09th September 2021

www.ijphy.org

10.15621/ijphy/2021/v8i3/1054

[1]Professor, Doctor in Physiotherapy, Catholic University of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: zacarias.sanchez@ucavila.es
[1]Professor Doctor in Physiotherapy, Catholic University of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: jorge.velazquezsaornil@ucavila.es
[1]Professor Doctor in Physiotherapy, Catholic University of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: elena.sanchez@ucavila.es
[1]Physiotherapy Graduate Student, Catholic university of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: alicilopgon97@gmail.com
[1]Professor in Physiotherapy, Catholic university of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: angelica.campon@ucavila.es
[1]Professor in Physiotherapy, Catholic university of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: encarnacion.mendez@ucavila.es
[1]Professor in Physiotherapy, Catholic university of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: sonia.gomez@ucavila.es
[1]Professor in Physiotherapy, Catholic university of Ávila. Spain /C. de los Canteros, S/N, 05005 Ávila, Spain. Email: ana.martin@ucavila.es

CORRESPONDING AUTHOR

*[1]Zacarías Sánchez Milá

Department of Physiotherapy, Universidad Católica de Ávila, Ávila, Spain.
Email: zacarias.sanchez@ucavila.es

INTRODUCTION

A masticatory system is a functional unit formed by the teeth, the periodontium (the set of ligaments that fix the tooth within the bony alveolus of the jaw), the oral mucosa, the jaws, the temporomandibular joints, the oral and masticatory musculature, the salivary glands, the vessels, and the nerves. This complex is involved in several fundamental functions: chewing, swallowing, articulation of words, expression of feelings, taste, and breathing [1]. Temporomandibular dysfunction (TMD) is a set of pathologies involving the masticatory muscles, the temporomandibular joint (TMJ), and associated structures [2]. It is one of the significant public health problems, as it causes chronic orofacial pain interfering with activities of daily living [3]. Twenty percent of the population has TMJ pathologies because it is a continuously used joint for speaking, eating, yawning, and breathing, among other functions. This continuous use causes early wear and tear and the appearance of pathologies such as disc displacement, limitation of joint movements, joint pain, and sounds, sensitivity, and muscle disorders, among others [4].75% of the population suffers from various symptoms of temporomandibular joint disorder [5], being more frequent in the adult population (35-44 years) with 34% of asymptomatic cases [6]. Some causes of temporomandibular disorders are chronic repetitive microtrauma, increased emotional stress, jaw injuries (tears or fractures), musculoskeletal micro-strain due to overuse, and sleep bruxism [7].

In TMD, Herpich et al. (2015) reported joint pain and difficulties in activities of daily living involving the joint (such as eating, yawning, talking, or smiling), classifying symptoms into muscle disorders, joint sounds, limited jaw movements, mandibular deviation (disc displacement), and pain and discomfort in the TMJ, ears, masticatory muscles or neck (unilateral or bilateral). Sharma et al. (2017) reported localizing pain mainly in the masticatory muscles or preauricular area, with symptoms manifesting with stiffness, jaw locking, and temporomandibular joint tenderness [8,9].

PATIENT INFORMATION

The patient is a 21-year-old woman who suffers from pain in the temporomandibular joint and has joint sounds when making jaw movements.

PHYSICAL EXAM

Due to the hyperlaxity of the TMJ, there is evidence of hypotonia of the right masseter and hypertonia of the left masseter due to force compensation, and he has no motor control over the movements he executes to the muscular imbalance of this joint.

A visual inspection is made from the sagittal plane. It is observed that the temporomandibular joint in a static position presents a muscular asymmetry, as the hypertonic left side slightly deviates the mouth and is not symmetrical with respect to the sagittal plane (Figure 1.). Therefore, the therapist proceeds to palpation of the temporomandibular joint to obtain an impression of the presence of inflammatory joint pain. The palpation is performed with the patient in the supine position, with the head turned to the opposite side and the mouth slightly open and protruding. From this position, the therapist can palpate: the anteroinferior synovial pole, the anterosuperior synovial pole, the collateral ligament of the TMJ, the posteroinferior synovial pole, and the posterosuperior synovial pole [10], asking the patient to open and close her mouth, assessing the articular displacements and the articular sounds she made. In addition, the masseter, medial pterygoid, and lateral pterygoid muscles were palpated, showing tight bands in the masseter and lateral pterygoid muscles.

Figure 1: A case report.

DIAGNOSTIC AND ASSESSMENT

She went to her family doctor for pain, who told her that it could be hyperplasia and referred her to the dentist. The dentist performed an x-ray and diagnosed hyperplasia and overbite.

The pain in the joint was assessed by algometry, thus evaluating the pain produced by sustained pressure. This was carried out bilaterally on the angle of the mandible, with 19.2 Newton (N) in the left mandibular angle and 24.6N in the right mandibular angle. We then proceeded to assess the articular range of the TMJ using the goniometric rule of all mandibular movements [11], such as mouth opening with 5cm, left displacement with 3.5 cm, right displacement with 2.5 cm, and protrusion with 0.1 cm.

In addition, the muscular strength of the main masticatory muscles was assessed by means of the Daniels muscle tests to show the hypertonicity of the left masseter and the hypotonia of the right masseter, with values for jaw depression with 4/5, jaw elevation with 4-/5, left displacement 5/5, right displacement 5/5 and protrusion 3+/5.

INTERVENTIONS

Manual therapy is performed to balance the tone of the muscles that cause pain in the joint, accompanied by a home training plan to maintain mobility.

The manual therapies performed are [12]:

Deep induction of the masseter fascia this technique aims

to improve the functioning of the TMJ and reduce the pain referred to in this region. It is performed with the patient in the supine position and the rotation head. The physiotherapist places the cranial hand on the zygomatic bone and the thumb of the caudal hand on the masseter muscle mass. The technique I: Gentle upward traction of the cranial hand is performed, and with fascial release, the thumb of the caudal hand begins to move towards the maxillary angle. Technique II: Sustained pressure is applied to the insertion of the masseter muscle at the level of the zygomatic arch.

Intrabuccal induction of the external pterygoid aims to release the myofascial restrictions and recover the functional coordination of the external/lateral pterygoids. The patient is supine, and the physiotherapist is seated at the head of the table. The technique is performed by palpating the TMJ with the index or middle finger, and with the other hand, we palpate the external pterygoid with an intrabuccal approach. Afterward, sustained pressure is applied until fascial release is felt. (Figure 2.)

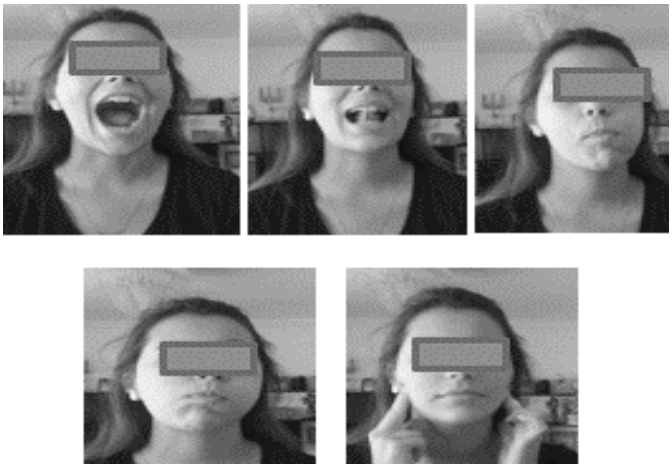
Figure 2. Manual Therapy.

Home treatment

The patient is taught a training plan with a series of exercises [13] that promote motor control of the temporomandibular joint, increase muscle strength and normalize muscle tone. (Figure 3.)

- Maximum oral opening.
- Sliding the tongue on the palate with the opening of the mouth.
- Holding air in the mouth for 3 seconds, a right and left oral lateralization is performed.
- Circular movements with the fingertips exert some pressure on the temporomandibular joint and masseter muscle.

Figure 3. Home treatment.



FOLLOW-UP AND OUTCOMES

A 14-day treatment plan was drawn up. Manual therapy was carried out on the 7th and 14th days for 20 minutes, each technique to not overload the temporomandibular joint musculature with information. (Table 1).

On the other hand, the home training plan is carried out every day for a maximum of 5 minutes, and the patient does it after lunch, which is when the joint feels most overloaded.

On Day 1, A pre-treatment evaluation was performed, and the physiotherapist taught the patient the exercises at home.

On Day 7, the manual therapy is performed for 60 minutes, followed by an assessment of the joint.

Finally, on Day 14, the manual therapy is performed for a total of 60 minutes, and then the patient is assessed, thus completing the treatment plan.

Table 1: Treatment plan.

Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	♦ •	♦	♦	♦	♦	♦	♦ • ♣	♦	♦	♦	♦	♦	♦	♦ • ♣

♦ Home treatment.

• Examination.

♣ Manual therapy.

Being a clinical case study, the results obtained were analysed at a quantitative level using the % change as a parameter in algometry and in joint assessment to compare the initial values against the final values. In the muscle values, comparison graphs are used, taking values (+3= 3.5; -4=4.25; +4= 4.5).

Concerning the significant results in the articular evaluation, it is observed in the movements of mouth opening, Left displacement, and Right displacement lateral displacement since a decrease in the articular range is produced (Table 2).

Table 2: Joint Assessment.

	Mouth opening (cm)	Left displacement (cm)	Right displacement (cm)	Protrusion (cm)
DAY 1	5	3,5	2,5	0,1
DAY 7	4,8	2,5	2,4	0,6
DAY 14	4,5	3,1	2,5	0,4
%CHANGE DAY 1- DAY 7	-4%	-28,57%	-4%	5%
%CHANGE DAY 1- DAY 14	-10%	-11,42%	0%	3%
%CHANGE DAY 7- DAY 14	-6,25%	24%	4,16%	-33,33%

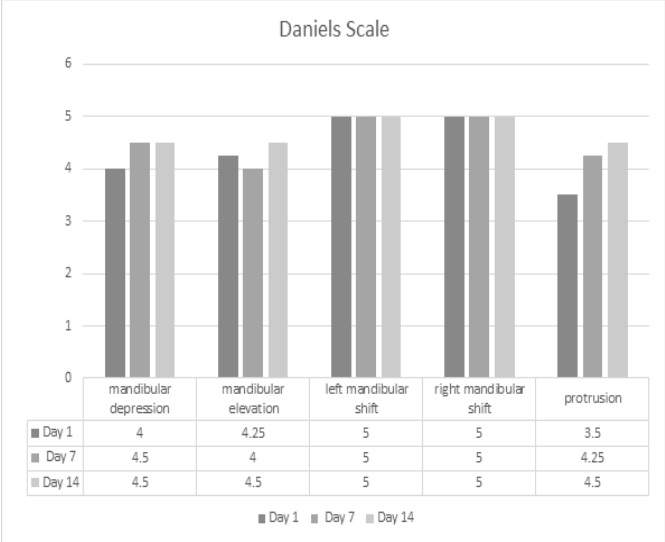
Looking at the assessment of pain on pressure using algometry (Table 3), there is an increase in pain, as the sensation of pain on pressure on the angle of the left mandible and angle of the right mandible appears earlier, indicating the direct impact of pain and TMJ function, with % changes analogous to each other (Day1- Day14).

Table 3: Algometry

	The angle of the left mandible (N)	The angle of the right mandible (N)
DAY 1	19,2	24,6
DAY 7	8,9	12,9
DAY 14	8,7	11,6
%CHANGE DAY 1- DAY 7	-53,64%	-47,56%
%CHANGE DAY 1- DAY 14	-54,68%	-52,84%
%CHANGE DAY 7- DAY 14	-2,24%	-10,07%

In terms of muscle assessment (Table 4), significantly positive results are observed in the mandibular depression, mandibular elevation, and protrusion movements. On the other hand, no changes are observed in the results of the lateral mandibular displacements.

Table 4: Daniels Scale



DISCUSSION

The preliminary results of this study reveal joint and muscle instability of the patient's temporomandibular joint and a deficit of motor control over the movements performed by the joint, causing her TMJ hyperlaxity.

After carrying out the treatment plan, the manual therapy, together with the home training plan, beneficial results are evidenced [14] transferred in the joint assessment, observing that after the treatment, there is a decrease in the joint range in mouth opening, Left displacement and right displacement, probably due to the increased tone of the external pterygoid, internal pterygoid and masseter muscles, as occurs in the research of Calixtre et al. (2015) in which they observed the normalization of the mandibular joint biomechanics, after manual therapy [15].

In the algometry, a decrease in tolerance to pressure on the joint is observed due to the early onset of pain, caused by the increased muscle sensitivity generated after manual therapy, Rodriguez-Blanco et al. (2015) reported in the treatment of temporomandibular disorders, in which they found no significant changes in pain reduction after the application of a neuromuscular technique over the masseter muscles and passive hamstring muscle stretching and suboccipital muscle inhibition technique [16].

The results obtained support the idea that the intervention of physiotherapists in temporomandibular disorders is essential for the reduction of pain and the improvement of motor control of joint movements. Therefore, if the treatment had been carried out on the patient for a more extended period, the results would have been even more significant and beneficial.

In turn, a significant point to consider during treatment is to include an education program for the patient about their pathology and the correct procedure for each exercise, thus guaranteeing good adherence to the treatment, as well as obtaining effective results and improving the quality of life of individuals [17].

One of the study's strengths is a low percentage of bias. In addition, the data were obtained under controlled conditions (space, time, materials, and assessment technique), and the data were analyzed accurately.

The study's limitations are due to the small sample size, as only one individual limits the research. Still, we can assure that manual therapy and therapeutic exercise are good treatments for patients suffering from temporomandibular disorders.

CONCLUSION

The manual therapy, together with the home training plan, has increased the stability of the temporomandibular joint, causing changes in the cadence of movement since the articular range of some movements has increased. Still, the range has also decreased in others. In turn, it has led to changes in TMJ pain, as an increase in pain on pressure has been observed after manual therapy. Therefore, it is clear that physiotherapy treatment in combination with home therapy improves TMJ dysfunction.

Acknowledgments

We want to thank the patient who has undergone this treatment to resolve her discomfort. We would also like to thank the Catholic University of Avila for the materials provided and the facilities.

Registration

This case report has been registered on the clinicaltrials.gov website and has been admitted with the following identifier number: NCT04811495. The authors declare that this intervention is carried out with the informed consent of the patient and respecting at all times the principles of the Declaration of Helsinki and that the research has not been subject to the Ethics Committee, as it is not an experimental intervention, nor one in which medication and /or medical devices are administered.

REFERENCES

[1] Echevarría JL, Echevarría JJ. Articulación temporomandibular. En: Miralles RC, Puig M, editores. Biomecánica clínica del aparato locomotor. Barcelona: Masson;2000: 281-91.

[2] Herpich CM, LeCal-Junior EC, Amaral AP, Tosato JP, Gloria IP, Garcia MB, et al. Effects of phototherapy on muscle activity and pain in individuals with temporomandibular disorder: a study protocol for a randomized controlled trial. 2014; 15:491. https://doi.org/10.1186/1745- 6215-15-491

[3] Armijo-Oliva S, Pitance L, Singh V, Neto F, Thie N, Michelotti A. Effectiveness of Manual Therapy and Therapeutic Exercise for Temporomandibular Disorders: Systematic Review and Meta-Analysis. Physical Therapy. 2016:9-25. https://doi.org/10.2522/ptj.20140548.

[4] Scrivani SJ, Keith DA, Kaban LB. Temporomandibular Disorders. The New England journal of medicine.2008;359(25): 2693-705. https://doi.org/10.1056/NEJMra0802472.

[5] Moreira M, Albertini R, Leal-Junior EC, De Tarso P, Silva JA, Kalil S, et al. Effects of exercise training and photobiomodulation therapy (EXTRAPHOTO) on pain in women with fibromyalgia and temporomandibular disorder: study protocol for a randomized controlled trial. 2015;252 https://doi.org/10.1186/s13063-015-0765-3.

[6] Sharma S, Ohrbach R. Definición, epidemiología y etiología de los trastornos dolorosos de la articulación temporomandibular. En: Fernández C, Mesa J. Trastornos de la articulación temporomandibular. Madrid: Editorial Panamericana;2020: 3-22.

[7] Firmani M, Reyes M, Becerra N, Flores G, Weitzman M, Espinosa P. Sleep bruxism in childrens and adolescents.Rev Chil Pediatr. 2015;86(5):373-9.

[8] Herpich CM, Amaral AP, Leal-Junior EC, Tosato JP, Gomes CA, Arruda ÉE, et al. Analysis of laser therapy and assessment methods in the rehabilitation of temporomandibular disorder: a systematic review of the literature. Journal of Physical Therapy Science.2015;27(1):295-301. https://doi.org/ 10.1589/jpts.27.295.

[9] Sharma S, Crow HC, Kartha K, McCall WD, Gonzalez YM. Reliability and diagnostic validity of a joint vibration analysis device. BMC Oral Health.2017;56. https://doi.org/10.1186/s12903-017-0346-9.

[10] Rocabado M, Fernández C. Examen clínico de la articulación temporomandibular y los músculos masticatorios. En: Fernández C, Mesa J. Trastornos de la articulación temporomandibular. Madrid: Editorial Panamericana;2020: 109-115.

[11] Aragón MC, Aragón F, Torres LM. Trastornos de la articulación témporo- mandibular.Rev. Soc. Esp. Dolor. 2005 ;12(7):429-435.

[12] Pilat A. Terapias miofasciales: Inducción miofascial. Madrid: Editorial interamericana; 2011:363-369.

[13] Herpich CM, LeCal-Junior EC, Amaral AP, Tosato JP, Gloria IP, Garcia MB, et al. Effects of phototherapy on muscle activity and pain in individuals with temporomandibular disorder: a study protocol for a randomized controlled trial. 2014; 15:491. https://doi.org/10.1186/1745- 6215-15-491.

[14] Tuncer AB, Ergun N, Tuncer AH, Karahan S. Effectiveness of manual therapy and home physical therapy in patients with temporomandibular disorders: A randomized controlled trial. J Bodyw Mov Ther. 2013 Jul;17(3):302-8. https://doi.org/10.1016/j.jbmt.2012.10.006.

[15] Calixtre L, Moreira R, Franchini G, Alburquerque-Sendín F, Oliveira A. Manual therapy for the management of pain and limited range of motion in subjects with signs symptoms of temporomandibular disorder: a systematic review of randomised controlled trials. J Oral Rehabil. 2015;42(11):847-61. https://doi.org/10.1111/joor.12321

[16] Rodriguez-Blanco C, Cocera-Morata FM, Heredia-Rizo AM, Ricard F, Almazán-Campos G, Oliva-Pascual-Vaca Á. Immediate Effects of Combining Local Techniques in the Craniomandibular Area and Hamstring Muscle Stretching in Subjects with Temporomandibular Disorders: A Randomized Controlled Study. J Altern Complement Med. 2015 Aug;21(8):451-9. https://doi.org/10.1089/acm.2014.0332.

[17] Delgado P, Plaza-Manzano G, Cleland J, Fernández C, Martín-Casas P, Díaz-Arribas MJ. Effects of Cervico-Mandibular Manual Therapy in Patients with Temporomandibular Pain Disorders and Associated Somatic Tinnitus: A Randomized Clinical Trial. Pain Medicine. 2019. https://doi.org/10.1093/pm/pnz278