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Systematic review

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Efficacy of global postural reeducation in pain of individuals with temporomandibular dysfunction: a systematic review

Eficácia da reeducação postural global na dor de indivíduos com disfunção temporomandibular: uma revisão sistemática

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RESUMO | INTRODUÇÃO: Disfunção temporomandibular (DTM) é caracterizada por um conjunto de alterações funcionais, que envolvem fatores predisponentes, iniciantes e perpetuantes. Considerando que os desvios posturais desorganizam a harmonia corporal entre a postura da mandíbula e todo o sistema esquelético, várias modalidades fisioterapêuticas foram propostas no tratamento da DTM, incluindo a Reeducação Postura Global (RPG). **OBJETIVO:** Avaliar sistematicamente as evidências sobre a eficácia da RPG no tratamento da dor em indivíduos com DTM. **METÓDOS:** Revisão sistemática realizada a partir da busca de publicações nas bases de dados Pubmed, Biblioteca Virtual em Saúde (Lilacs, Scielo e Medline), PEDro e Cochrane Library, de maio a setembro de 2017. Os critérios de inclusão: Ensaios clínicos randomizados (ECR) e Ensaios clínicos controlados (ECC); artigos publicados em língua inglesa, portuguesa e espanhola; que abordavam sobre o tratamento com RPG; com indivíduos adultos > 18 e ≤60 anos; diagnosticados com DTM; que continham avaliação da dor. Excluídos: estudos duplicados; que utilizaram exercícios para pacientes pós-cirúrgico e que apresentassem doenças sistêmicas ou qualquer afecção que afetasse o sistema osteomioarticular; que avaliaram pacientes com histórico de trauma facial ou cervical e em uso de medicamentos. **RESULTADOS:** Um total de 349 artigos foram encontrados, que após a eliminação de duplicatas, filtragem de títulos, resumos e leitura de texto completo foram incluídos na pesquisa três estudos, o que evidenciou a eficácia da RPG na redução da dor. **CONCLUSÃO:** Considerando os resultados obtidos neste estudo, foi possível concluir que a RPG demonstra ser eficaz na redução da dor presente na DTM. Porém, faz-se necessários mais ensaios clínicos randomizados com maior rigor metodológico, protocolos mais bem definidos, que possam auxiliar na tomada de decisão clínica e que contemplem também a comparação do tratamento entre homens e mulheres.

PALAVRAS-CHAVE: Transtornos da ATM. Dor. Postura. Reeducação postural global.

ABSTRACT | INTRODUCTION: Temporomandibular dysfunction (TMD) is characterized by a set of functional alterations, which involves predisposing, initiative and perpetuating factors. Considering that postural deviations disorganize the body arrangement between the jaw posture and the entire skeletal system, several physical therapy modalities have been proposed in the treatment of TMD, including Global Postural Reeducation (GPR). **OBJECTIVE:** To evaluate systematically the evidence of the efficacy of GPR in the treatment of pain in individuals with TMD. **METHODS:** This study is a systematic review, based on the searching of publications in the scientific databases - Pubmed, Virtual Health Library (Lilacs, Scielo and Medline), PEDro and Cochrane Library, from May to September 2017. Inclusion criteria: Randomized controlled trials (RCTs) and controlled clinical trials (RCTs); articles published in English, Portuguese and Spanish; which dealt with RPG treatment; with adult individuals> 18 and ≤60 years; diagnosed with TMD; which contained pain assessment. Excluded: duplicate studies; who used exercises for post-surgical patients and who presented with systemic diseases or any affection that affected the osteomioarticular system; who evaluated patients with a history of facial or cervical trauma and using medications. **RESULTS:** 349 articles were found. After the elimination of duplicates, title filtering, abstracts and full text reading we included three studies, which evidenced the efficacy of GPR in reducing pain. **CONCLUSION:** Considering the results obtained in this study, it was possible to conclude that the GPR demonstrates to be efficacy in the pain reduction present in TMD. However, more randomized clinical trials with more methodological rigor, better defined protocols, that can aid in clinical decision-making and that also contemplate the comparison of treatment between men and women.

KEYWORDS: TMJ disorders. Pain. Posture. Global postural reeducation.

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Introduction

Temporomandibular dysfunction (TMD) is characterized as a set of functional alterations that involves predisposing, initiatives and perpetuating factors, leading to the presence of orofacial pain[1]. Alterations in temporomandibular joint (TMJ) are associated with disarrangement of the anatomic structures that belonged to it such as disc, condyle and articular eminence. Epidemiological date has demonstrated that TMD affects 20% to 30% of adult population, with 20 to 40 years old, with predominance in women[2, 4].

The TMD has a variety of risk factors, including macro and micro traumas, musculoskeletal or occlusal alterations, muscular hyperactivity, articular dysfunctions, and psychological factors[3]. According to Biasotto et al.[5], the postural deviations, such as forward head posture, rectification of cervical spine and shoulders asymmetry, have been found in patients with TMD, which can initiate signs and symptoms as articular movement limitations, orofacial pain, headaches, buzzing in the ears, malocclusion and presence of noises (clicking) when moving the joint[6].

Considering that postural deviations disorganize the body arrangement, leading to alterations between the jaw posture and the entire skeletal system, which can result in pain, several physical therapy modalities have been proposed in the treatment of TMD[7, 1]. Among these treatment modalities, there is Global Postural Reeducation (GPR), which aims to reestablish the balance of myofascial tensions and the body posture, decreasing the pain and incapacity. This method is based on the composition of muscle chains and recommends the global stretching of those muscles, considering the principle that the dysfunctions can occur from the retractions of muscle chains presented in the whole body[8,9].

Despite of being widely used in clinical practice, it seems to have low amount of scientific evidences that prove the benefits of the therapeutic using of GPR in pain treatment in TMD. Therefore, the objective of the present study was to evaluate systematically the evidence of the efficacy of GPR in the treatment of pain in individuals with TMD.

Methods

This study is a systematic review, based on the searching of publications in the scientific databases - Pubmed, Virtual Health Library (Lilacs, Scielo and Medline), PEDro and Cochrane Library, from May to September 2017. We selected articles without limit of year of publication. In the process of bibliographic survey, we used open searching with Health Science Descriptors (DesCS) and Medical Subject Headings (MeSH), associated with free terms. The terms used in this review were Temperomandibular Joint Disorders, Pain, Posture, Global Postural Reeducation, with Boolean operators "AND" and "OR", to compound the combinations of words that presented better sensitivity and specificity to the research, Table 1. It is important to highlight that the present study does not have protocol and registry available for consulting.

Table 1. Searching strategy in PubMed databases

Combinations	"Temporomandibular joint disorders" AND (global posture reeducation OR GPR) AND pain "Temporomandibular joint disorders" AND (global posture reeducation OR GPR) AND posture "Temporomandibular joint disorders" AND pain AND posture
Filters	Randomized controlled trial OR controlled clinical trial

The inclusion criteria considered for this study was: 1) Randomized Clinical Trial (RCT) and Controlled Clinical Trial (CCT); 2) articles published in English, Portuguese and Spanish languages; 3) studies that approach about GPR treatment; 4) with adults individuals > 18 and ≤60 years; 5) studies that evaluated pain; 6) individuals diagnosed with TMD.

The exclusion criteria was: 1) duplicated studies; 2) studies that used exercises in patients in post-surgery and that presented systemic diseases or any disease that affected the osteomioarticular system; 3) studies that evaluated patients with history of facial or cervical trauma; 4) patients in the use of medicines.

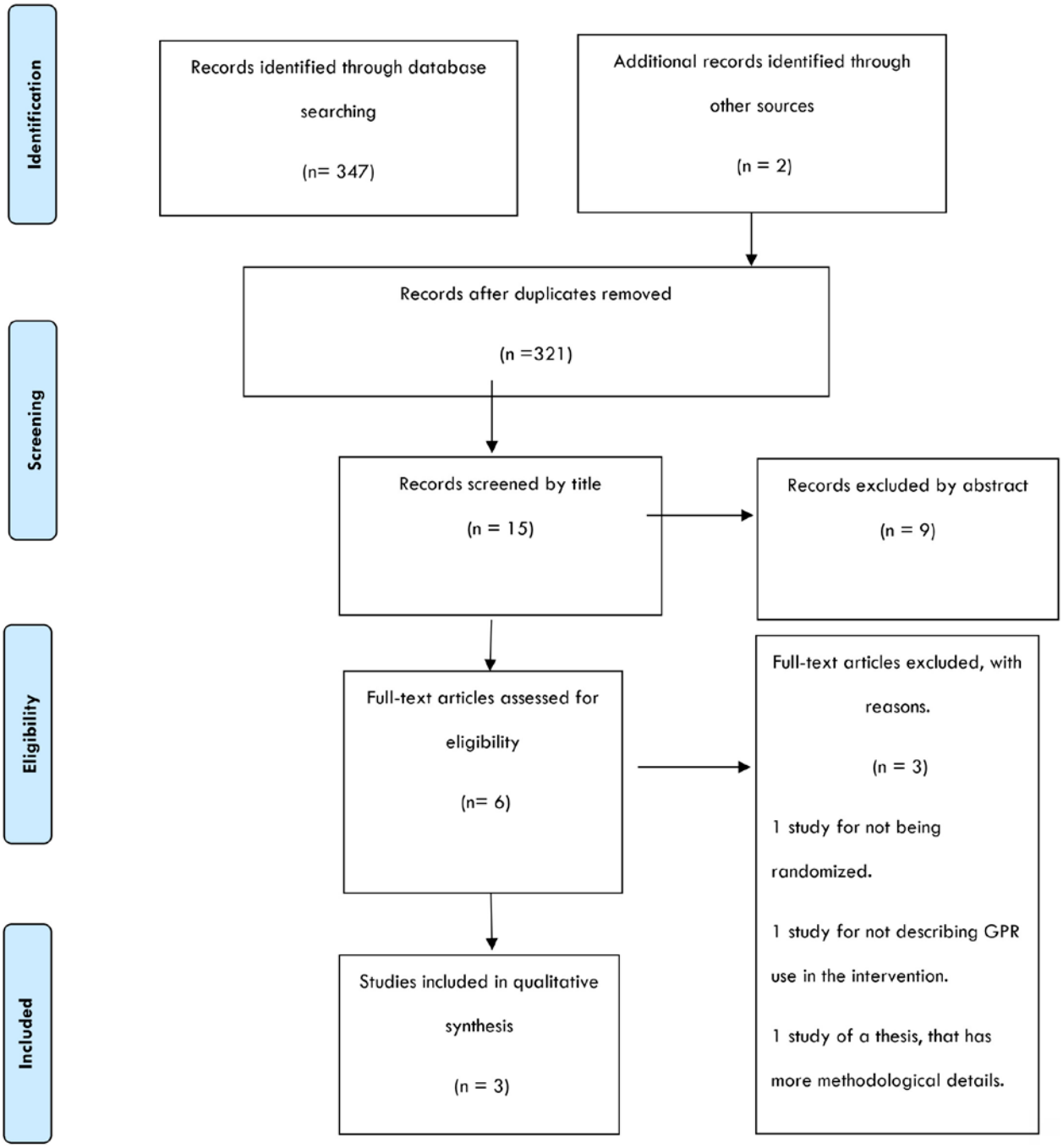
The selection process occurred primarily with the exclusion of duplicated articles, followed by the reading of titles and abstracts of the articles identified in the searching process and assessed for its suitability. Secondly, the articles recovered were evaluated to inclusion. The references of the articles recovered were researched to look for the potential eligible studies. The results were summarized according to the methods of assessment of the pain, such as Algometer, Visual Analog Scale (VAS) and Part I for the score Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), with statistical significance of <0,05.

To the methodological analysis after inclusion, we used the PEDro scale, which consists in a questionnaire of 11 questions that evaluate the methodological quality of RCT, considering that from the second item on is numbered zero or one to the answers, adding the total punctuation to the scale from 0 to 10 points, presenting a reliability from reasonable to good.

Results

We have found 349 articles, from them 306 were excluded because of the title, remaining 43 articles, and from them 28 were excluded for duplication. After the exclusion of the duplicated, 15 abstracts were eligible, in which nine of these studies were excluded. After the elimination of duplicates, title filtering and abstracts, 06 articles were selected for the entire reading and analyzed theirs suitability as it is demonstrated in Figure 1. From these 06 articles, 03 were excluded for not comply the inclusion criteria previously define: 1 study for not being a RCT, 1 study for not describing the use of GPR in the intervention and 1 for being an article of a thesis that has been already included, which has shown to be with more methodological details, Figure 01.

Figure 1. Flow Diagram of the selection process of the articles according to PRISMA.



Characteristics of the studies

To the qualitative synthesis of systematic review, we included two randomized clinical trials and one controlled clinical trial published in 2006, 2009 and 2016. 134 women participated of the studies, in which one article presented less sample with 28 patients[8] and another presented more sample with 70 patients[10], with mean age varying from 22,56 ± 3,40 years to 36,2 ± 9,8 years. The treatment was in average twice per week among the studies, with duration of 15 to 45 minutes each session. The articles were summarized in one table with information about the authors and year, study design, groups and results, Table 2. The Table 3 presents the synthesis of treatment protocols used in those studies, with information about weekly frequency, time and duration of the sessions. The results of the qualitative analysis of the three articles are described in Table 4, with each item classified as Yes or No; in which one study got 7 points and the two others got 5 points each.

Table 2. Synthesis of the studies about the efficacy of the GPR in pain in individuals with TMD. (to be continued)

Source	Study design	Sample size	TMD Diagnostic	Pain assessment	Control Group	Group GPR	Results	*p* value
Maluf, 2006 (Thesis)	Randomized clinical trial	N: 28 IG: 14 (Mean age=30,0) CG:14 (Mean age=30,08). Loss: 2 patients per group: IG (12) GC (12) (Both groups with TMD)	Helkimo index III	Visual analog scale (VAS) and algometer	G2: segmentar static stretch exercises	G1: "frog in the air" and "frog on the floor".	**VAS** Within-group (Intensity) G1: 1st evaluation 8,47 ± 1,38 x 2nd evaluation 3,02 ± 2,51 1st evaluation 8,47 ± 1,38 x 3rd evaluation 3,74 ± 2,44 G2: 1st evaluation 7,20 ± 1,10 x 2nd evaluation 2,28 ± 1,93 / 1st evaluation 7,20 ± 1,10 x 3rd evaluation 3,45 1,93 **ALGOMETER** (Masseter - Threshold) Within-group G1: 1st evaluation 2,01 ± 0,65 x 2nd evaluation 2,81 ± 0,82 / 1st evaluation 2,01 ± 0,63 x 3rd evaluation 2,65 ± 0,94 G2: 1st evaluation 1,65 ± 0,61 x 2nd evaluation 2,73 ± 0,29 1st evaluation 1,65 ± 0,61 x 3rd evaluation 2,75 ± 0,42 Between-group Initial G1: 2,01 x G2: 1,95 After 1ª session G1:2,81 x G2:2,73 End of treatment (2 months) G1:2,65 x G2:2,75	1st evaluation and 2nd evaluation= *p* <0,05 1st evaluation and 3rd evaluation= *p* <0,05 1st evaluation and 2nd evaluation= *p* <0,05 1st evaluation and 3rd evaluation= *p* <0,05 G1x G2: *p* > 0,05 1st evaluation and 2nd evaluation= *p* <0,05 1st evaluation and 3rd evaluation= *p* <0,05 1st evaluation and 2nd evaluation= *p* <0,05 1st evaluation and 3rd evaluation = *p* <0,05 G1 x G2: *p* > 0,05
Fiorelli et al., 2016 (Article)	Randomized Controlled clinical trial	70 N: 25 excluded, Remained 35 women CG: 17. IG: 18 (Both groups with TMD)	DC/TMD	Algometer	No treatment	G1: 8 types of exercises	**Pain Threshold (Masseter)** G1: 1st evaluation (left side) 2,0 ± 1,1 x 2nd evaluation (left side) 0,80 ± 0,6 / 1st evaluation (right side) 2,20 ± 1,1 x 2nd evaluation (right side) 0,60 ± 0,6	G1 x G2: *p* < 0,05

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Table 2. Synthesis of the studies about the efficacy of the GPR in pain in individuals with TMD. (conclusion)

Source	Study design	Sample size	TMD Diagnostic	Pain assessment	Control Group	Group GPR	Results	p value
Sestare, 2009 (Dissertation)	Randomized clinical trial.	Loss: 3 patients IG (15) e 2 patients CG (15) Mean age of both groups: 36,2 ± 9,8 years 36 N: 20 excluded. Remained 16 women CG: 7 without TMD (mean age 25 ± 5,20 years) IG: 9 with TMD (mean age 22,56 ± 3,40 years) Loss 2 patients in CG (9)	DC/TMD	DC/TMD (Part I for score)	No treatment	G1: "frog on the floor with closed arms" and "standing against the wall"	G2: 1st evaluation (left side) 1,40 ± 1,2 x 2nd evaluation (left side) 1,73 ± 1,1 / 1st evaluation (right side) 1,53 ± 1,1 x 2nd evaluation (right side) 1,66 ± 1,0 **Intensity of pain** G1: 1st evaluation x 2nd evaluation p > 0,05 G1: 2nd evaluation x 3rd evaluation (after 16 sessions) p <0,05	G1 x G2: 3rd evaluation (after 16 sessions) p > 0,05 G1 x G2: 2nd evaluation p <0,05

Subtitle: G1/ IG: GPR Group; G2/ CG: Control Group.

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Table 3. Synthesis of the protocols used in the included studies. (to be continued)

Source	N°	CG/IG	Frequency (Week)	G1	G2	Duration	Number of sessions/ Intervention Duration
Maluf, 2006	28 (24)	12/12	1x	Pompage Technique + 1. Frog in the air with closed arms 2. Frog on the floor with open arms	Static stretching: spine, cervical, head, upper limbs and mandibular muscles (masseter and temporal) bilateral	G1: 15 mins each position G2: 30 secs; for 3 times with 10 secs of resting Total 30 mins	8/ 2 months
Sestare, 2009	36 (16)	7/9	2x	Relaxation of diaphragm + 1. Frog on the floor with ed arms ng against the wall	No treatment	25 mins each position + 5 mins of resting between them + 1 min between the posture 2	16/ 2 months
Fiorelli et al., 2016	35 (30)	15/15	2x	1. Dorsal decubitus (DD), flexion of one hip and extension of the other hip with ankle dorsiflexion. 2. DD, bilateral extension of lower limbs against the wall with ankle dorsiflexion. 3. DD, one lower limb with ankle dorsiflexion, leaning against the wall and the contralateral member resting.	No treatment	1. 3 times alternating by 15 secs each 2. 5 mins 3. 3 times alternating by 15 secs each 4. 5 mins	12/ 2 months and a half

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Table 3. Synthesis of the protocols used in the included studies. (conclusion)

Source	N°	CG/IG	Frequency (Week)	G1	G2	Duration	Number of sessions/ Intervention Duration
				4. DD, external hip rotation with flexed knees, feet leaning against the wall.		5. 3 times alternating by 5 secs each	
				5. Sitting, spine leaning against the wall, one flexed knee and the other one extended.		6. 5 mins	
				6. Sitting, spine leaning against the wall, knees extended and feet in dorsiflexion.		7. 3 times alternating by 15 secs each	
				7. Sitting without trunk support, one flexed knee and the other one extended.		8. 5 mins	
				8. Sitting, without trunk support, extended knees with feet dorsiflexion.		Session duration 45 mins	

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Table 4. Evaluation of risk of bias in PEDro scale.

PEDro Scale	Maluf [8]	Fiorelli et al [10]	Sestare [11]
Item 2.	Yes	Yes	Yes
Item 3.	Yes	No	No
Item 4.	Yes	Yes	Yes
Item 5.	No	No	No
Item 6.	No	No	No
Item 7.	Yes	No	Yes
Item 8.	Yes	Yes	No
Item 9.	No	No	No
Item 10.	Yes	Yes	Yes
Item 11.	Yes	Yes	Yes
Total Score	**7/10**	**5/10**	**5/10**

Subtitle: (2) subjects were randomly allocated to groups; (3) allocation was concealed; (4) the groups were similar at baseline regarding the most important prognostic indicators; (5) there was blinding of all subjects; (6) there was blinding of all therapists who administered the therapy; (7) there was blinding of all assessors who measured at least one key outcome; (8) measures of at least one key outcome were obtained from more than 85% of the subjects initially allocated to groups; (9) all subjects for whom outcome measures were available received the treatment or control condition as allocated or, where this was not the case, data for at least one key outcome was analysed by "intention to treat"; (10) the results of between-group statistical comparisons are reported for at least one key outcome; (11) the study provides both point measures and measures of variability for at least one key outcome.

Interventions

In Maluf's study[8], the intervention group made the "Frog in the air with closed arms" and "Frog on the floor with open arms" postures, the control group made only the segmental static stretching. Fiorelli et al.[10] realized in the intervention group 8 types of exercise that consisted in posterior muscle chain stretching of vertebral spine and lower limbs, associated with prolonged expiration techniques and self-stretching. In the study of Sestare[11], the experimental group made "Frog on the floor with closed arms" and "Standing against the wall".

Pain assessment

As an assessment criteria of the pain, Maluf[8] used in his study the Algometer and VAS. Fiorelli et al.[10] used the algometer and Sestare(11) used the Part I for the score DC/TMD. The scales used in those studies showed the improvement of the pain in the individuals treated with GPR and segmental static stretching, with the level of statistical significance <0,05.

Discussion

The present study evidenced that GPR demonstrates to be an efficacy technique in pain reduction in individuals with TMD, in which the improvement of the symptom pain, research variable, was clinically more expressive in intervention groups than in control groups, after the treatment.

In Maluf's study[8], the effects of GPR and segmental static stretching in the pain in individuals with TMD was compared, in which the 1st evaluation occurred before the treatment, the 2nd was right after the treatment and the 3rd was two months later. In the intragroup analysis, both treatments decreased statistically significance the pain when compared the 1st with the 2nd evaluations and the 1st with the

3rd evaluations. In the intergroup analysis, there was no significance statistical difference between interventions, which means that both were equally effectives in decreasing the intensity of the pain. The revaluation in mid-term, after 2 months of the treatment showed discreet loss of the gains obtained.

Another Randomized Clinical Trial with 33 women, comparing GPR with static segmental stretching in the pain, range of motion and quality of life in women with cervicalgia, found similar results as the anterior, concluding that both were equally efficacy in decreasing pain[15]. In this way, two studies[8,15] that compared GPR with segmental stretching, although they had different populations, do not showed advantage from the first technique above the second one.

Both segmental stretching and global stretching are types of static stretching that differ from each other mainly for the duration of the stretching and the way of stretching a muscle. In the first, the duration is short, varying from 15 to 60 seconds, and the stretching is an isolated muscle or a specific muscular group. In the second, the duration is long, approximately 15 to 20 minutes, in muscular groups of the same muscular chain[12,13].

Sestare's study[11] found similar results as Maluf[8], related with the decreasing of pain, but in this study the control group was formed by individuals without TMD and they have not received any kind of intervention. In the intragroup analysis, the group subjected to GPR presented significant statistical difference in pain reduction when compared the 2nd to the 3rd evaluation. In the intergroup analysis, the group subjected to GPR presented significant statistical difference only in the 2nd evaluation, even though this difference did not happened in the 3rd evaluation (after 16 sessions).

The gains obtained with the treatment tend to maintain in mid-term as it can be noticed in Maluf's study[8], especially when the patient receives orientations after the treatment regarding home exercises. According to Sestare[11], it would be necessary to orientate the volunteer women concerning the daily activities, also to elaborate an exercise program to maintain the gains obtained with the treatment.

Corroborating with Maluf[8] and Sestare[11] studies, Fiorelli and colleagues[10] made a study with two groups with TMD, the control group have not received any kind of treatment and the intervention group was subjected to a program of global postural exercises, with 8 types of positions. Both in the intragroup and intergroup analysis there was significant statistical difference when compared the 1st with the 2nd evaluation and the 1st with the 3rd evaluation, differing from the control group in which the intensity of the pain increased substantially. None of the groups cited related the benefits of the treatment with GPR or global postural exercises in a long-term[8, 10, 11].

We have not found studies comparing the GPR with others physical therapy techniques. As limitation of this study, we highlight the homogeneity of the population of the studies cited, i.e. all of them recruited the same genre, i.e. feminine; some studies have not made an intervention in control group to comparison, increasing risk of bias; and the sample size was short.

Conclusion

Considering the results obtained in this review, it is evidenced that there is not superiority among GPR, postural exercises and segmental static stretching. It was possible to conclude that GPR demonstrates to be efficacy in decreasing pain present in TMD, in which it was emphasize the treatment of muscular chains added to a body conscience and respiration. However, it is necessary more randomized clinical trials with more methodological rigor, better-defined protocols, that can aid in clinical decision-making and that also contemplate the comparison of treatment between men and women. Thus, the literature about the efficacy of GPR in treatment of TMD is still emergent.

Authors Contributions

Melo MMS participated in the conception, design, searching, interpretation of the results and writing the scientific article. Pataro SMS oriented the study, participated in the design, interpretation of the results, writing and reviewing the scientific article.

Conflict of Interests

No financial, legal or political conflict of interests with third parties (government, commercial, private foundation, and others) were disclosed for any aspect of the submitted study (including grants, data monitoring board, study design, manuscript preparation, statistical analysis, and others).

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