ORIGINAL ARTICLE

Is inadequate swallowing associated to masticatory myofascial pain?*

A deglutição inadequada está associada à presença de dor miofascial mastigatória?

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SUMMARY

BACKGROUND AND OBJECTIVES: Muscles of mastication, involved with the pathophysiology of the masticatory myofascial pain, also participate in the swallowing function. Given the controversial results about the relationship between temporomandibular dysfunction (TMD) and swallowing abnormalities, this study aimed at checking the presence of swallowing function abnormalities in females with masticatory myofascial pain.

METHOD: Three swallowing tests (one solid and two liquid) were performed in 30 females with myofascial pain (study group = SG) and 30 healthy females (control group = CG). Changes in swallowing patterns, such as periorbicular muscles contraction, chin contraction, head movements, swallowing followed by noise, choking, lower lip interposition, pain after swallowing and swallowing with anterior projection of the tongue were observed during the three tests. Results were described and compared between groups by Chi-square and Fisher's Exact tests with signiflcance level of 0.05 and confldence interval of 95%.

RESULTS: SG participants had a higher chance of atypias during one liquid swallowing test [Chi-square test; $p < 0.05$; OR: 3.29; CI 95% (1.08 – 9.95)]. However, there has been no association between TMD and atypical swallowing features evaluated in all tests.

CONCLUSION: Inadequate swallowing was associated to masticatory myofascial pain only during liquid ingestion. However, it was not possible to associate a speciflc atypia to TMD in this sample.

Keywords: Speech therapy, Swallowing, Temporomandibular joint dysfunction syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os músculos da mastigação, envolvidos na flsiopatologia da dor miofascial mastigatória, também participam da função de deglutição. Diante dos resultados controversos sobre a relação entre disfunção temporomandibular (DTM) e alterações na deglutição, o objetivo deste estudo foi verifl-car a presença de alterações na função da deglutição em mulheres com dor miofascial mastigatória.

MÉTODO: Três testes de deglutição (um sólido e dois líquidos) foram realizados em 30 mulheres com dor miofascial (grupo de estudo = GE) e 30 mulheres saudáveis (grupo controle = GC). Alterações nos padrões de deglutição como contração da musculatura periorbicular, contração mentual, movimentos de cabeça, deglutição acompanhada de ruído, engasgos, interposição de lábio inferior, dor após deglutição e deglutição com projeção de língua para anterior foram observadas durante os três testes. Os resultados foram descritos e comparados entre os grupos através dos testes Qui-quadrado e Exato de Fisher com nível de signiflcância de 0,05 e intervalo de conflança a 95%.

RESULTADOS: Participantes do GE apresentaram chance maior de presença de atipias durante um dos testes de deglutição de líquido [teste Qui-quadrado; $p < 0,05$; OR: 3,29; IC 95% (1,08 – 9,95)]. Entretanto, não houve associação entre a presença de DTM e características atípicas da deglutição avaliadas em todos os testes.

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CONCLUSÃO: Deglutição inadequada esteve associada com a presença de dor miofascial mastigatória apenas durante a ingestão de líquido. Entretanto, não foi possível associar um tipo específlco de atipia à DTM nesta amostra.

Descritores: Deglutição, Fonoaudiologia, Síndrome da disfunção da articulação temporomandibular.

INTRODUCTION

Temporomandibular dysfunction (TMD) is a collective term including clinical problems involving masticatory muscles, the temporomandibular joint (TMJ) and associated structures, which is identifled as the major cause for non dental pain in the orofacial region.

Masticatory muscles are involved with miofascial pain pathophysiology, a TMD subtype, and the presence of pain at palpation is necessary to flll diagnostic criteria[1]. These muscles participate in swallowing, in elevating the mandible during the oral phase and in allowing teeth contact and lips sealing.

Some studies have observed association between TMD and inadequate swallowing features with controversial results, both in adult and pediatric patients. Abnormal swallowing patterns were present in 76% of patients with TMD and this has suggested that patients could adapt the swallowing function to avoid pain[2]. A correlation between facial pain and abnormal swallowing was observed[3] and was attributed to digastric muscle hyperactivity. Although pointing out that approximately 19.6% of patients had atypical swallowing, a study evaluating TMD patients has not found association with atypical swallowing, but has highlighted features such as sudden laryngeal movements, periorbicular muscles contraction and anterior head compensation[4].

A study with children between 3 and 5 years of age has observed that in this age group atypical swallowing was positively related to TMD signs and symptoms. However, authors suggest that atypical swallowing may be a common flnding in this age group caused by artiflcial sucking, which leads to major morphological changes[5]. A study comparing children with and without TMD has observed no association between abnormal swallowing and TMD. Authors have suggested that the function might have been altered by other factors, such as mixed dentition or malocclusion[6].

Given the controversial results about the correlation between TMD and swallowing, this controlled study aimed at checking the presence of swallowing function changes in females with masticatory miofascial pain.

METHOD

This transversal, case control, double blind study was carried out in the Clinic of the Speech Therapy Course, University of Franca (UNIFRAN) with a sample of 60 females aged between 18 and 65 years, consecutively seen and during flrst visit, in a private dentistry clinic of the city of Franca, with orofacial pain complaint or for routine clinical exam, who fulfllled inclusion and exclusion criteria.

Exclusion criteria were: upper, lower or both total prosthesis, neurological disorders, individuals who had suffered trauma or tumors in head and neck, and individuals with brackets. Participants with the following occlusion factors were also excluded: skeletal open bite, unilateral crossbite, absence of 5 or more teeth, deep overbite and intense overjet.

Participants were divided in two groups: control group (CG) and study group (SG).

SG (n = 30) was composed of patients with miofascial pain with and without mouth opening limitation (axis I, diagnosis IA and IB) according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) classiflcation criteria[2]. For better sample accuracy during masticatory muscles palpation, only patients with pain in one of 12 sites were included: anterior, middle and posterior portion or origin of the temporal muscle, masseter muscle body and insertion. Pain at palpation of these areas should be familiar to patients, endorsing location reported in the RDC/TMD questionnaire.

For CG (n = 30) female patients seen for routine exams without TMD signs and symptoms for at least six months and with no need to oral rehabilitation were selected.

Participants came to the Speech Therapy Clinic, UNIFRAN in day and time scheduled by telephone, from April to August 2009, for swallowing evaluation following the Orofacial Motility Evaluation Protocol[6]. Participants were informed about the objectives of the research and have signed a free and informed consent term.

Three tests were used to evaluate swallowing function, one with solid food (French bread) and two with liquids (water). Participants sat in front of the researchers with body posture vertically erect to the horizontal plane, head oriented in parallel to the Frankfurt plane, sagital axis perpendicular to horizontal axis and with feet on the ground.

In the flrst test, solid food was offered and they were asked to chew and swallow normally. In the second test a transparent glass with water was offered and they were asked to drink the water as usual. In the last test they

were asked to keep the water in the mouth until the researcher would request them to swallow.

Without touching participants, swallowing pattern changes were observed, such as: periorbicular muscles contraction, chin contraction, head movements, swallowing followed by noise, choking, lower lip interposition, pain after swallowing and swallowing with anterior projection of the tongue[6].

To prevent unbalancing the process by masking some unreal swallowing type, lips were not opened by the researchers. At the end of the evaluation we have asked whether participants had swallowing difflculties.

This study has considered that participants had inadequate swallowing when at least one atypical feature was present during each test.

It has to be stressed that, during evaluation, researchers did not know the group to which participants belonged. Patients' condition, for both groups, was only known through information given by the dentist, who was responsible for selecting the groups at evaluation completion.

Komogorov-Smirnov test was applied to determine age distribution and then *t* test was applied. Data were described for each group. Chi-square and Fisher Exact tests were used to check possible associations between the presence of swallowing changes and the groups during the three tests, and Odds ratio was calculated to check the ratio between groups taking as reference CG. The Minitab software was used for such analyses with the following values: signiflcance level 0.05 and confldence interval of 95%.

This study was approved by the Ethics and Research Committee, University of Franca, under protocol 020/2009.

RESULTS

Mean age for SG (n = 30) was 39.4 years and for CG (n = 30) it was 36.8 years, without difference between groups (2-t test; p = 0.41).

Three swallowing tests were performed. Three SG participants (10%) and flve CG participants (16.67%) had normal swallowing in the three tests. There has been no signiflcant difference between groups (Table 1).

Table 1 – Results of the three tests with regard to swallowing (adequate/inadequate) and the presence of atypias.

	Test I - Solid			Test II - Liquid			Test III - Liquid		
Swallowing*	GE n (%)	GC n (%)		GE n (%)	GC n (%)		GE n (%)	GC n (%)	
Adequate	11 (36.7)	17 (56.7)	p = 0.121	7 (23.3)	15 (50)	p = 0.03	9 (30)	10 (33.3)	p = 0.781
Inadequate	19 (63.3)	13 (43.3)		23 (76.7)	15 (50)		21 (70)	20 (66.7)	
Atypias**									
Periorobicular muscle contraction	12 (40)	15 (50)	p = 0.604	11 (36.7)	11 (36.7)	p = 1	19 (63.3)	19 (63.3)	p = 1
Chin contraction	8 (26.7)	7 (23.3)	p = 1	6 (20)	4 (13.3)	p = 0.731	6 (20)	8 (26.7)	p = 0.761
Head movements	9 (30)	5 (16.7)	p = 0.360	4 (13.3)	3 (10)	p = 1	6 (20)	0 (0)	p = 0.024
Lower lip interposition inferior	4 (13.3)	3 (10)	p = 1	11 (36.7)	6 (20)	p = 0.252	3 (10)	4 (13.3)	p = 1
Anterior projection of the tongue	1 (3.3)	1 (3.3)	p = 1	4 (13.3)	3 (10)	p = 1	1 (3.3)	1 (3.3)	p = 1

* Chi-square test; ** Fisher Exact Test; SG = study group; CG = control group.

In test II (liquid), 76.67% of SG participants had inadequate swallowing as compared to 50% of CG. There has been signiflcant difference between groups [Chi-square test; $p < 0.05$; OR: 3.29; CI 95% (1.08 – 9.95)].
There has been signiflcant difference in test III (liquid) with regard to head movements (Fisher Exact test, $p < 0.05$).
No patient has reported pain after swallowing or had cough or choking in all tests.
Three SG participants (10%) have reported swallowing difflculties. No CG patient reported difflculties.

DISCUSSION

This study aimed at evaluating swallowing in TMD female patients. So, the hypothesis was that pain in such muscles would affect the swallowing patterns of such patients, but this was only partially confirmed by this study since although females with TMD had inadequate swallowing in one liquid swallowing test, there has been no speciflc association between TMD and atypical swallowing in each test performed.
According to the World Health Organization, female gender has the highest prevalence of chronic musculoskeletal pain and headaches. In addition they are the most prevalent among TMD patients[7].
Mean sample age was similar to those shown by population studies checking the presence of TMD[7] and is also in line with a study evaluating patients seen by a Brazilian clinic specialized in orofacial pain. Results have shown that 86.8% were females with mean age of 32 years and most complaints and diagnoses were related to TMD of the muscular subtype[8].
The presence of muscular TMD in this study was evaluated by RDC/TMD diagnostic criteria[1], developed by a consensus among specialists and researchers so that there would be a tool available to diagnose TMD patients[9]. For better sample accuracy, this study has considered muscle TMD patients those with 3 or more painful sites at extraoral palpation. This because intraoral palpation of lateral pterygoid muscle has not enough specifIcity to diagnose muscle TMD.
Even without signiflcant difference as compared to CG, 90% of SG participants had inadequate swallowing considering the results of the three tests, which is in line with some studies with adult populations[2-4]. In the pediatric population, a study with similar methodology has also not shown signiflcant association between inadequate swallowing and TMD signs and symptoms[6].
During the solid swallowing test, SG participants had a higher number of atypical features. Head movements (30%) and difficult swallowing (23.33%) were more present as compared to CG (16.67% and 3.33%, respectively), although without significant difference. Head movement was significant in TMD patients during the second liquid test. With head movement the oropharyngeal space is increased, thus helping swallowing. Due to masticatory inefficiency, TMD patients may present excessive swallowing effort[4]. So, for having pain in mandible elevator muscles, these patients may have presented swallowing difficulties and may have moved their heads in an attempt to compensate pain[2].
TDM patients had three times more chance of inadequate swallowing as compared to CG during the flrst liquid swallowing test (OR = 3.28; CI 95%; OR 1.08-9.95). More SG patients had lower lip interposition (36.67%) as compared to CG (20%), although without signiflcant difference. Lower lip interposition during swallowing is due to the need to seal the lips and indicates the presence of adapted swallowing, probably due to the presence of malocclusion, with excessive overjet[6]. This study has not directly evaluated occlusion and facial type, but the exclusion of participants needing oral rehabilitation, using prosthesis or brackets and with severe malocclusion factors, such as skeletal open bite, unilateral crossbite and intense overjet may have decreased the impact of this bias in this study and may justify the fact that differences were not signiflcant.
During the flrst liquid swallowing test, participants were asked to swallow as usual. In the second test, they were asked to keep the liquid in the mouth until the requested moment. There has been no difference in this test among features presented by the groups. It is possible that in the second test, participants have better controlled their swallowing, thus justifying such difference.
This was a controlled study using validated criteria for TMD diagnosis; however, results cannot be generalized for the population since the sample consisted of patients looking for private dentistry offlce and with a speciflc type of TMD. The analysis of occlusion, facial type and more speciflc tests are needed to analyze swallowing features.
We suggest that further studies with prospective methodology, control group and adequate sample size, should evaluate whether the presence or absence of TMD, according to all its subtypes, interferes with patients' swallowing.

CONCLUSION

Inadequate swallowing was associated to the presence of masticatory miofascial pain in females only during liquid ingestion. However, it was not possible to associate a specifIc atypia to temporomandibular dysfunction in this sample.

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