

EFFICIENCY OF MYOFUNCTIONAL THERAPY IN CASES OF PHONOLOGICAL, PHONETIC AND PHONETIC-PHONOLOGICAL DISORDERS

Verificação da eficiência da abordagem terapêutica miofuncional em casos de desvio fonológico, fonético e fonético-fonológico

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ABSTRACT

Background: the use of myofunctional therapy in cases of phonetic and/or phonological disorders. **Procedures:** we included subjects being six and 13 year old, both genders, with phonetic and/or phonological disorders, and stomatognathic system alterations. We considered an exclusion criterion the presence of malformations, genetic syndromes, suspected neurological, psychological or cognitive impairment, hearing loss, diagnosis of language delay, speech therapy before, and malocclusion. Were held anamnesis, evaluation of the stomatognathic system, articulatory examination, hearing screening and otorhinolaryngological evaluation. We held two therapy weekly. Surveys were carried out every eight sections. We analyzed the comparison between the number of speech sounds and features/structures of the stomatognathic system alterations before and after such therapy, and also the comparison between subjects in relation to length of therapy according to the found speech disorder. **Results:** the subjects with phonological disorder showed between one and four alerted phonemes, the subjects with a phonetic deviation showed one altered phoneme, but the subjects with a phonetic-phonological deviation had five to six altered phones/phonemes, respectively. The cases of phonological and phonetic deviation had proper speech. One of the subjects with a phonetic-phonological deviation had proper speech, and the other showed an altered phone. **Conclusion:** myofunctional therapy was efficient in cases of phonetic and/or phonological deviations.

KEYWORDS: Speech; Stomatognathic System; Myofunctional Therapy; Articulation Disorders

■ INTRODUCTION

Speech is related to the maturation and development of the orofacial myofunctional system. The integrity of this system is necessary to its proper production. According to researchers, the proper stomatognathic or orofacial structures, such as teeth, lips and tongue, are important in the consonantal articulation, because of the air flow alteration they cause¹.

The phonological disorder is characterized by the improper use of speech segments, considering the adult pattern from the linguistic community in which the child is². It may be identified through phonological processes, with segments deletion and/or substitution, and some other features³, and there are no organic alterations⁴⁻⁶.

The phonetic disorder is mechanical articulatory production alteration. It may occur distortions such as lisp, interdentalization, etc, and they are caused mainly by alteration of bone and/or muscle structures, involved in articulation⁷. There may also be co-occurrence of alteration in both levels, the phonetic-phonological disorder⁸.

The myofunctional therapy, usually, is not used in treatments of speech disorders, being in the edge of phonological and phonetic/articulatory therapy,

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even in cases of speech alterations with stomatognathic system alterations.

As the speech sounds articulation depends on the phonoarticulatory organs integrity, the stomatognathic system alterations may be the cause of speech disorders or they may difficult the correct production.

In the case of phonological disorders, it is believed that the linguistic disordering may be influenced by the motor inability or praxical difficulty in the phonemic performance, causing omissions and or substitutions. In the cases of phonetic disorders, other researchers describe that the stomatognathic system alterations may be the cause of distortions⁹.

It is believed that in the cases of speech alterations with stomatognathic system alterations, the adequacy of the stomatognathic structures which are involved in articulation would favor speech improvement, minimizing the time of therapy.

Thus, the purpose of this study was to analyze the efficiency of the myofunctional therapeutic approach in cases of phonological, phonetic and phonetic-phonological disorders. This analysis was performed through comparison between the number of speech altered phones/phonemes and altered aspects in the stomatognathic system before and after myofunctional therapy.

Besides, it was analyzed, in case of myofunctional therapy efficiency, to which cases it can be applied, by comparing the therapy time, according to the presented speech alterations, as well as the comparison between the groups regarding the number of speech altered phonemes/phones and altered aspects in the stomatognathic system before and after therapy.

■ CASES PRESENTATION

This case report is a description of six cases of speech disorders. Two of them with phonological disorders, two with phonetic disorders, and two with phonetic-phonological disorders. The subjects were between six and thirteen years old, male and female, five boys and one girl, and they were treated through exclusive myofunctional therapy.

This study is connected with a research project, registered in the projects cabinet of a university, n. 026225. Besides, it was approved by the research ethics committee by the same institution, by n. 23081.010320/2010-09.

The selected subjects were waiting for therapy in the Speech-Language Therapy Service, by a university between March and August, 2010. The researchers contacted the people responsible for the children, through telephone calls or letters, when it was explained for them the procedures of

this research and it was scheduled a day for the anamnesis and initial evaluation.

The participation in the research by the subjects was authorized by parents and/or responsible people who signed the informed consent, following the Resolution MS 196/96. Not only the referred aspects were considered, but also some inclusion criteria such as presence of speech and orofacial motricity alterations, male and female children and minimal age of four years old (age when the phonological disorder can be diagnosed and when typical children present well developed praxical skills). In relation to speech alterations, it was included patients with phonetic, phonological or phonetic-phonological disorders.

It was considered as phonetic disorder the sounds production with presence of phonic distortion or imprecision with organic origin; as phonological disorder, it was considered speech production with presence of repair strategies (substitution, omission, insertion or transposition of the target phoneme with linguistic origin (mental organization); and, as phonetic-phonological disorder, it was considered the presence of both alterations⁸.

It was included children who presented alteration of the fricative and/or liquid phones or phonemes, because these segments presented higher incidence of speech alterations by the subjects who were waiting for treatment in the mentioned institution.

Regarding the orofacial motricity alterations, it was included patients who presented mobility, muscular tension and/or tongue posture alterations, concomitantly or not with alterations of lips, cheeks, and functions of breathing, chewing and swallowing.

It was considered as exclusion criteria in this research the presence of orofacial malformations, genetic syndromes, suspicion of neurological alterations, suspicion of cognitive or psychological deficit, hearing loss, as well as speech-language diagnosis of language delay, and historical of speech-language therapy.

It was also excluded of this study cases of subjects who presented, in the first evaluation or during the treatment, malocclusion, anterior and posterior open bite, overjet, absence of superior and/or inferior incisor tooth, because of teeth exchanges (from deciduous to mixed dentition).

To select the sample, the following procedures were performed: anamnesis, speech-language evaluations of speech and stomatognathic system; and otorhinolaryngologic evaluations and hearing screening.

The anamnesis presented questions about general development, such as pregnancy, childbirth, birth conditions, psychomotor and language

development, education, personal characteristics, physiopathological and pathological family cases, to verify the selection criteria.

In relation to the stomatognathic system evaluation, it was based on the protocol by the Speech-Language Service, in which it was analyzed the phono-articulatory organs (lips, tongue, cheeks, soft palate, hard palate, jaw and dental arches) regarding morphology, posture, muscular tension, swallowing and breathing, to verify possible organic factors which could impede the correct sounds production.

The evaluation was based on the protocol of Articulatory Examination, used by the speech-language service. This evaluation was used to detect phonetic and phonological alterations. Such exam is performed by repetition of monosyllable and dissyllable words, allowing the production of all Brazilian Portuguese consonants in all possible word and syllable positions. During the test applying, the children should repeat a list of 187 words which were said by the examiner, without visual support. This evaluation was recorded and, then, transcribed by the researcher. Based on that, it was performed a survey of the phonetic and phonological inventory of each subject.

The otorhinolaryngological evaluation was performed through oral pharyngoscopy, anterior rhinoscopy, otoscopy and indirect laryngoscopy. The oral pharyngoscopy aims at the inspection of the palatine tonsils. The anterior rhinoscopy has the purpose of searching disorders of the midline, extreme inflammatory signals, septal dislocation and nasal septum deformities. The otoscopy is the examination of the external ear canal and of the tympanic membrane through the auricular speculum, with direct and indirect illumination. With the indirect laryngoscopy, it is intended to observe the larynx in static and dynamical way¹⁰.

The hearing screening was performed in silent environment with *Interacoustics Screening Audiometer AS208*, calibrated. The patient was placed in front of the evaluator and back to him/her, and the patient was asked to stand up every time he/she heard the signal. The evaluated frequencies were 500, 1000, 2000 e 4000 Hz. It was considered as normal the Auditory Threshold lower or equals 15 dB¹¹.

From the 32 subjects who were waiting for therapy in the speech and oral motricity service, 22 presented phonetic and/or phonological disorders, from those, six were according to the criteria for sample selection; five male and one female, with ages between six and 13 years old; two with phonological disorders (subjects 1 and 2), two with phonetic disorder (subjects 3 and 4), and two with phonetic-phonological disorders (subjects 5 e 6). The subjects

were divided according to the presented speech pathology: subjects with phonological disorders (G1), subjects with phonetic disorders (G2) and subjects with phonetic-phonological disorders (G3).

In relation to the altered phones, the subject 1, male, seven years old, presented phonological disorder with substitution and/or omission of three fricative phonemes and a liquid phoneme /s, z, Z, r/. The subject 2, male, nine years old, presented phonological disorder with substitution and/or omission of the phoneme /r/. The subject 3, female, twelve years old, and the subject 4, male, thirteen years old presented phonetic disorders, type frontal lisp, with distortion of the phoneme [s]. The subject 5, male, six years old, presented phonetic-phonological alteration with omission and/or substitution of the phoneme /r/ and distortion of the 4 fricative phones [s, z, S, Z], characterized as lateral lisp. The subject 6, male, six years old, presented phonetic-phonological disorder with omission and/or substitution of the two non lateral liquid phonemes /r, R/ and distortion of four fricative phones [s, z, S, Z], type lateral lisp.

The subjects 1 and 2 presented the target phonemes in their phonetic inventory, but not in their phonological inventory. Besides, they did not present any type of phonic distortion.

In general, regarding the stomatognathic system, the subjects presented posture alteration, muscular tension and tongue, lips and cheeks mobility. The subject 1 presented posture alteration and tongue muscular tension, as well as lips muscular tension and altered cheeks. The subject 2 presented tongue and lips muscular tension and posture, and also muscular tension of altered cheeks. The subjects 3 and 4 presented altered tongue muscular tension and posture, respectively. The subject 5 presented tongue posture, muscular tension and mobility, as well as altered lips muscular tension. The subject 6 presented tongue posture, muscular tension and mobility, and also altered cheeks posture and mobility.

The subject of this research presented discrete alterations in their stomatognathic system, it means that the aspects of muscular tension, posture and mobility were not relevant to alter the stomatognathic functions. An example was the fact that some subjects performed some mobility with difficulties, instead of not performing.

All the subjects, after those evaluations, received exclusive myofunctional therapy. The subjects had two appointments a week, of, approximately, 45 minutes. During the sessions, there were games to promote the performance of the orofacial motricity exercises in a playful way. The myofunctional therapy was based on the use of some exercises

of muscular tension, mobility and posture adequacy which were altered (not including phonoarticulation)¹². The exercises were selected based on the literature and according to the structural alterations presented by the research subjects.

The isotonic exercises were performed in three series with 15 repetitions of each one. The isometric exercises lasted 30 minutes, repeated in three series. In case the patient presented tiredness, the exercises were interrupted and they restarted after some minutes.

As tongue exercises¹³, some examples are to put the tongue in the palate anterior part and to rub it in and out; to put the tongue in the palate anterior part and to open and close the mouth; to line the tongue sustaining it in the position; to suck the tongue against the palate and to keep it there stretching the lingual frenulum out, letting it fall with open mouth.

The lips exercises, in cases of alteration, were: to close the contracted lips exaggeratedly (as pronouncing "o" without sound); to stretch the superior lip under the verge of the superior incisors; to show the teeth with open mouth (smile), in exaggerated way.

The exercises, in case of altered cheeks, were: to inflate and to release cheeks; to inflate cheeks alternately, the air going to one cheek to the other one; to articulate, without sound "i-u" exaggeratedly; to blow a balloon or party whistles.

It was not indicated home exercises in order to avoid the target of this variable, because not all families participated in the therapy.

The surveys were performed every eight therapy sessions, in which the stomatognathic system and speech evaluations were repeated, to verify the children's improvements. It was considered criterion of Speech-language treatment discharge, the

correct production of the elicited sounds according to the adult target, during articulatory evaluation, with frequency of 100%. It was considered as production categorical percentage, different from other studies which considered frequency of correct production from 75 to 80%, because this instrument evaluates the performance through repetition. It is known that this elicitation way may propitiate speech improvement, but if the child is not able to produce the phone/phoneme properly, even so he/she will not be successful. So, it is a reliable way of evaluation^{13,14}.

Based on the obtained results, it was performed descriptive analysis. The following analysis were performed: comparison between the number of phones/phonemes of speech and altered structures/aspects of the stomatognathic system before and after the myofunctional therapy; comparison, among the subjects, in relation to time of therapy, according to the present speech alteration; comparison of the groups regarding the number of speech altered phones/phonemes and altered aspects in the stomatognathic system before and after the myofunctional therapy.

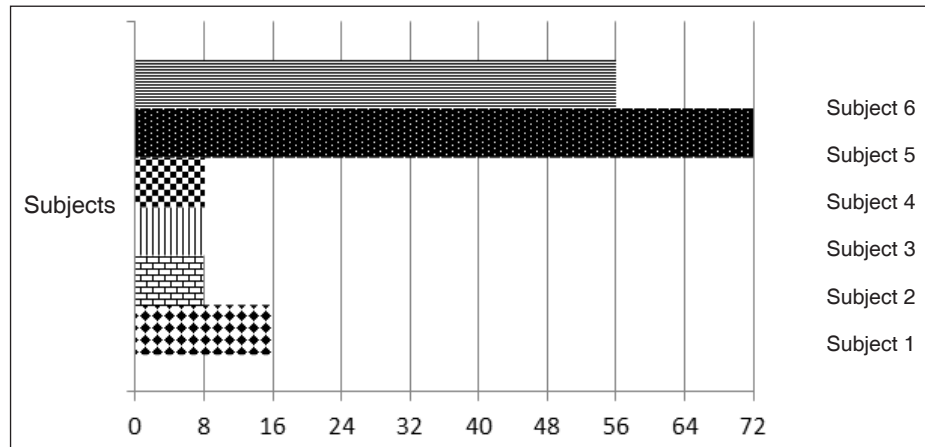
■ RESULTS

As it is observed in Table 1 and in Figure 1, the G1 subjects presented between one and four altered phonemes in their speech, and from one to five aspects/structures in the stomatognathic system, respectively. Both G1 subjects presented proper speech through the adequacy of the aspects/structures of the stomatognathic system. Subject 1 presented proper speech after 16 sessions, and subject 2 presented proper speech after 8 sessions of myofunctional therapy.

Table 1 – Comparison between the number of altered phones/phonemes and the altered aspects of the stomatognathic system before and after myofunctional therapy

		Altered Phone/Phonemes				Altered structures and aspects			
		Pre-Therapy *		Post-Therapy*		Pre-Therapy *		Post-Therapy*	
		N	F	N	F	N	F	N	F
G1 – DPI	S1	4 (40%)		0 (0%)		4 (44,4%)		0 (0%)	
	S2	1 (10%)		0 (0%)		5 (55,5%)		0 (0%)	
G2 – DPn	S3	1 (10%)		0 (0%)		2 (22,2%)		0 (0%)	
	S4	1 (10%)		0 (0%)		4 (44,4%)		0 (0%)	
G3 – DPP	S5	5 (50%)		0 (0%)		4 (44,4%)		0 (0%)	
	S6	6 (60%)		1 (10%)		5 (55,5%)		0 (0%)	

Legend: N – number; F frequency; G1- group 1, G2 – group 2, G3 – group 3, DPI – phonological disorder, DPn – phonetic disorder, DPP- phonetic phonological disorder, *number of altered speech phonemes, considering the 10 phones/phonemes; ** number of altered aspects or structures in the stomatognathic system, considering the 9 evaluated possibilities.



Legend: *subject 6 (sujeito 6) remained with one altered phone, even after 72 therapy sessions

Figure 1 – Number of necessary therapy sessions to speech adequacy

The G2 subjects presented alterations in one speech phone, and two and four aspects and structures of the stomatognathic system, respectively. Both subjects presented proper speech after eight myofunctional therapy sessions (Table 1 and Figure 1).

The G3 subjects presented alterations in five and six speech sounds, and four and five altered stomatognathic system aspects structures, respectively. Subject 5 presented four altered phones and one altered phoneme and presented proper speech after 72 myofunctional therapy sessions. Subject 6 presented four altered phones and two altered

phonemes and, even after 56 therapy sessions, the individual did not present completely proper speech, remaining with an altered phone (Table 1 and Figure 1).

The subjects who presented phonetic disorder demonstrated better benefits with myofunctional therapy (Table 2). It is considered also that those patients presented lower number of speech altered sounds. The subjects with phonological disorders had the same benefits, S2 (one altered phoneme) presented proper speech after 8 therapy sessions, and subject 1 (four altered phonemes) presented proper speech after 16 therapy sessions.

Table 2 – Comparison among the groups regarding the number of altered speech phones/phonemes and altered aspects in the stomatognathic system before and after myofunctional therapy

	Group 1 – Phonological disorder	Group 2 – Phonetic disorder	Group 3 – Phonetic- phonological disorder
N. of altered sounds pre-therapy*	2.5	1	5.5
N. of altered sounds post-therapy*	0	0	0.5
N. of altered aspects pre-therapy**	4.5	3	4.5
N. of altered aspects post-therapy**	0	0	0

Legend: *adding up the numbers of altered speech sounds and divided by two subjects, **adding up the number of altered aspects in the stomatognathic system and divided by two subjects.

The subjects with phonetic-phonological disorders, even being part of the slower group to speech adequacy, were also benefited with myofunctional therapy, S5 produced all speech sounds in a proper way, and S6 presented five from six altered phones/phonemes produced properly. It must be emphasized that these subjects presented higher number of altered stomatognathic system aspects and structures, mainly in relation to the tongue (Table 2).

■ DISCUSSION

The efficacy of the therapeutical models with phonological basis have been already evidenced by some researchers^{2,6,15-23}; as well as the efficacy of the myofunctional therapy in the treatment of stomatognathic system alterations²⁴⁻²⁷. There are no researches which relate isolated myofunctional therapy in the treatment of phonological and phonetic-phonological disorders, although those alterations have already been referenced as cause to phonetic disorders^{1,9}. Even so, some researchers have investigated the relationship between oral praxis and speech^{28,29}.

It was performed a study relating tongue praxis and the performance of the liquid /r/ in two groups of children, with and without alterations in this phoneme (with and without phonological disorder). The authors verified that the group with difficulty to perform the liquid /r/ had difficulty to perform the tongue praxis, such as sucking the tongue against the palate, to line it, to widen it and to vibrate it²⁸.

Another study searched the relationship among muscular tension, non verbal praxis and speech. In this study, as well as in the previous one, it was evaluated children with and without phonological disorder. In this research, the authors verified significant relationship between tongue muscular tension and non verbal praxis, as well as non verbal praxis and speech²⁹.

Some researchers³⁰ performed a phonological disorders case study, describing its therapeutic process. In this research, the use of phonological therapy, previously used, did not favor the emergence of the glide in English. Even so, through an investigation, using acoustic spectrography, it was perceived an attempt to produce the phoneme, not perceived to eye. The authors, imagining the phoneme as acquired, referred that the child's difficulty seemed, at that moment, to be in the phonetic or praxis tongue level and, after the use of an easy phonetic context to the decrease of the occurrence of the unusual glide form, it was obtained success and speed in speech adequacy.

In this study, as well as in the previous researches, the sounds with the highest incidence are the fricatives^{1,9}.

With the present study, it is perceived that the myofunctional therapy may benefit the adequacy of phones and the acquisition of the speech phonemes, through the adequacy of the aspects (mobility, muscular tension and posture) and structures (lips, tongue and cheeks) of the stomatognathic system, as in the phonological as in the phonetic disorders, and in the phonetic/phonological alterations. Specially, it occurs with liquid sounds, which were adjusted in all cases.

It is deniable that there is the mental origin of the disorder, in the case that there was no phonemes omission and/or substitution, but it is believed that the linguistic disorganization may have been influenced by neuro-motor inability to perform those phonemes. Other authors observe that the praxis/motor difficulties may difficult the phoneme acquisition in the phonetic level^{28,29}.

In the cases of phonetic disorder, it was expected that, according to the adjustment of the stomatognathic system, the speech alterations would be minimized, because other researchers verified the possibility to occur phonetic disorders in stomatognathic inadequacy^{1,9}.

By analyzing only the aspects and structures of the stomatognathic system, the myofunctional exercises which were selected to this research were efficient to the stomatognathic system adequacy. On the other hand, in other studies, it was verified that the tongue rest position remained altered^{24,25}.

In a study with 20 children from four years old to four years old and 11 months, organized in two groups, with and without myofunctional therapy, it was the purpose to evaluate, through clinical examination, the adequacy of the orofacial musculature after the removal of sucking habits such as sucking the bottle and pacifier and the applying of orofacial myofunctional therapy. It was verified that the myofunctional therapy was able to increase the upper lip, lower lip and cheeks resistance. Besides, it was observed changes in the tongue musculature resistance²⁴. In the present study, those benefits were also observed.

Another research was performed with the purpose of analyzing the effects of the association between myofunctional therapy and the removal of the sucking habits in the rehabilitation of swallowing and tongue rest. Two groups of ten children from four years old to four years old and eight months were analyzed. Examinations pre-treatment and 60 and 180 days post-procedures were performed. The group that was submitted to myofunctional therapy adjusted the swallowing and tongue position patterns

before the group that did not perform myofunctional therapy, concluding that the myofunctional therapy, associated with the removal of sucking habits, such as bottle and pacifier, presented better and faster adequacy to the pattern of swallowing and tongue rest position²⁵. In the present research, even without analyzing the oral sucking habits, the myofunctional therapy was also able to adjust the tongue position.

In another study, it was aimed at describing the improvement of mouth breather children, submitted to orofacial myofunctional therapy, with emphasis in the muscular strengthening of the phono-articulatory organs and nasal breathing training, with the participation of six children, with ages between five and 11 years old. It was evidenced that, after being submitted to 10 sessions of orofacial myofunctional therapy, all the patients improved the pattern of lips sealing and possibility of nasal breathing²⁶. In the present study, the lips sealing was proper for all subjects.

In order to evaluate the effects of the association between the removal of sucking habits and the orofacial myofunctional therapy in more frequent nasal ventilation, it was performed a study with 20 children from four years old to four years old and eight months, in two groups, submitted only to the habits removal, or to the habits removal and, then, to the myofunctional therapy. It was observed

that the group submitted to myofunctional therapy obtained more benefit²⁷. In the present study, the myofunctional therapy was efficient in the adequacy of the stomatognathic system in all subjects.

■ CONCLUSION

With this study, it was observed that the myofunctional therapy offered benefits to the treatment of those cases of phonological, phonetic and phonetic-phonological disorders when there were speech organs alterations, promoting adequacy of the phones and acquisition of the altered phonemes.

The myofunctional therapy presented higher efficiency in cases of phonetic disorders and in the cases with lower number of altered aspects or structures of the stomatognathic system. It was also verified that the speech adequacy occurs concomitantly with the stomatognathic system adjustment. The last one may interfere in the first one.

It is suggested the performance of more studies about the subject, with a higher corpus, in order to verify the efficiency of the myofunctional therapeutic approach in the speech treatment with other groups of children. The reason of this suggestion is that the results found in this research are applied to the studied cases and, so, not subject to generalization to the whole population.

RESUMO

Tema: o tema desta pesquisa é o uso da terapia miofuncional em casos de desvios fonético e/ou fonológicos. **Procedimentos:** foram incluídos sujeitos, de ambos os sexos, com idades entre seis e 13 anos, que apresentassem desvio fonético-fonológico, e alterações do sistema estomatognático, com idade mínima de quatro anos. Considerou-se como critério de exclusão a presença de malformações, síndromes genéticas, suspeita de alterações neurológicas, déficit cognitivo ou psicológico, perda auditiva, diagnóstico de atraso de linguagem, terapia fonoaudiológica anterior, e alterações oclusais. Realizou-se anamnese, avaliação do sistema estomatognático, exame articulatorio, triagem auditiva e avaliação otorrinolaringológica. Com os sujeitos selecionados, foram realizados dois atendimentos semanais, de terapia miofuncional. Realizaram-se sondagens a cada oito sessões de atendimento. Foram comparados o número de fones/fonemas da fala e estruturas/aspectos do sistema estomatognático alterados antes e depois da terapia miofuncional, comparação entre os sujeitos em relação ao tempo de terapia de acordo com a alteração de fala apresentada, comparação entre os grupos quanto ao número de fones/fonemas e aspectos do sistema estomatognático alterados antes e depois da terapia miofuncional. **Resultados:** os sujeitos com desvio fonológico apresentavam entre um e quatro fonemas alterados, os sujeitos com desvio fonético apresentavam um fone alterados; já os sujeitos com desvio fonético-fonológico apresentavam cinco e seis fones/fonemas alterados, respectivamente. Os casos de desvio fonológico e fonético tiveram a fala adequada. Um dos sujeitos com desvio fonético-fonológico teve a fala adequada, e o outro permaneceu com um fone alterado. **Conclusão:** a terapia miofuncional demonstrou-se eficiente em casos de desvios fonético e/ou fonológicos.

DESCRITORES: Fala; Sistema Estomatognático; Terapia Miofuncional; Transtornos da Articulação

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