Original Article

https://doi.org/10.1590/2317-6431-2021-2462

Audiology Communication Research
ISSN 2317-6431

The use of kinesio taping in the treatment of the acute phase of post-stroke facial paralysis

O uso da *kinesio taping* no tratamento da paralisia facial pós-acidente vascular cerebral fase aguda

Simone Rosa Barreto[1] *Aline Mansueto Mourão*[2] *Tatiana Simões Chaves*[3] *Laelia Cristina Caseiro Vicente*[2]

ABSTRACT

Purpose: To compare the results of treatment of facial paralysis after ischemic stroke in the acute phase with and without the use of Kinesio Taping. **Methods:** Experimental case-control study with 46 patients with facial paralysis after stroke, randomly assigned to two groups for treatment of facial mimicry: the case group underwent orofacial myofunctional therapy and used Kinesio Taping on the zygomatic major and minor muscles while the control group only received orofacial myofunctional therapy. To assess facial paralysis, the House and Brackmann scale and the movement incompetence protocol were used for facial measurements. All participants underwent 12 days of treatment for facial mimicry. The analysis considered movement incompetence by means of the face measurements and the degree of impairment of facial paralysis, checking whether age might have influenced the results. Association analyses were performed and the significance level adopted was 5%. **Results:** both groups showed an improvement in facial asymmetry after treatment, movement incompetence was lower in all facial measurements, and the improvement in the severity of facial paralysis was similar, with no statistical difference between treatments. **Conclusion:** Both the exclusive orofacial myofunctional therapy and the one combined with Kinesio Taping are therapeutic strategies that promote improvement in post-stroke facial paralysis.

Keywords: Facial paralysis; Kinesio; Stroke; Rehabilitation; Speech Therapy

RESUMO

Objetivo: comparar os resultados da reabilitação da paralisia facial pós-acidente vascular cerebral isquêmico na fase aguda, com e sem o uso da Kinesio Taping. **Métodos:** estudo experimental caso e controle com 46 pacientes com paralisia facial pós-acidente vascular cerebral, distribuídos em dois grupos de forma randomizada, para a reabilitação da mímica facial: o grupo caso realizou terapia miofuncional orofacial e fez uso da Kinesio Taping nos músculos zigomáticos maior e menor e o grupo controle apenas terapia miofuncional orofacial. Para avaliação da paralisia facial, foi utilizada a escala de House e Brackmann e o protocolo de incompetência do movimento para as medições da face. Todos os participantes realizaram 12 dias de intervenção fonoaudiológica para a reabilitação da mímica facial. Para análise, considerou-se a incompetência do movimento por meio das medidas da face e o grau de comprometimento da paralisia facial e foi verificado se a idade poderia ter influenciado os resultados. Foram realizadas análises de associação e o nível de significância adotado foi de 5%. **Resultados:** os dois grupos apresentaram melhora da assimetria facial após intervenção fonoaudiológica, a incompetência do movimento foi menor em todas as medidas da face e a melhora da gravidade da paralisia facial foi semelhante, sem diferença estatística entre os tratamentos. **Conclusão:** tanto a terapia miofuncional orofacial exclusiva, como associada ao uso da Kinesio Taping, são estratégias terapêuticas que promovem melhora da paralisia facial pós-acidente vascular cerebral.

Palavras-chave: Paralisia facial; Kinesio; Acidente Vascular Cerebral; Reabilitação; Fonoaudiologia

Study carried out at Hospital Risoleta Tolentino Neves, Universidade Federal de Minas Gerais – UFMG – Belo Horizonte (MG), Brasil.
[1]Programa de Residência Integrada Multiprofissional em Saúde, Ênfase em Saúde do Idoso, Hospital Risoleta Tolentino Neves – HRTN – Belo Horizonte (MG), Brasil.
[2]Departamento de Fonoaudiologia, Faculdade de Medicina, Universidade Federal de Minas Gerais – UFMG – Belo Horizonte (MG), Brasil.
[3]Unidade de Acidente Vascular Cerebral, Hospital Risoleta Tolentino – HRTN – Belo Horizonte (MG), Brasil.
Conflict of interests: No.
Authors' contributions: SRB was responsible for data collection, literature review and writing the article; TSC was responsible for results analysis and article review; AMM was responsible for writing, study guidance and article review; LCCV was responsible for study conception and design, study guidance, writing, article review and final approval of the version to be published.
Funding: None.
Corresponding author: Simone Rosa Barreto. E-mail: simonerbarreto09@gmail.com
Received: January 11, 2021; **Accepted:** June 03, 2021

INTRODUCTION

Facial paralysis (FP) is a common sequelae in patients who have had a stroke[1-4]. A study found that almost half of the post-stroke individuals studied had facial paralysis[1]. Such sequelae occur due to the interruption of motor information to the facial muscles by alteration in the central facial motor pathway and by lesions in the frontal cortex pyramidal motor neurons that reach the ipsilateral and contralateral facial motor nuclei[3-7].

Central facial paralysis (CFP) affects the mobility and facial symmetry of the muscles in the lower third of the face contralateral to the lesion, and may be associated with other neurological symptoms such as dysarthria, apraxia, dysphagia, motor changes, and/or language deficits[2,5-7].

The literature points out that individuals with paralysis of the facial muscles, in addition to alterations in facial mimics, chewing, swallowing and speech, also have psychological and social problems, because the movements of facial expression ensure effective communication between individuals, which is important in the socialization process[8-10].

The elastic Kinesio Taping (KT) bandage was created in 1973 by Dr. Kenzo Kase. In order to fix it to the skin, KT has a special latex-free glue, which allows the skin to breathe without obstructions and does not have medication in its composition[7-12]. It is a flexible external aid for the human body, which may stretch returning to its original size, thus allowing the movement of the muscles to which it was applied[8-13]. The KT tape acts by stimulating and activating the muscles during movements, improving the contraction of weakened, inhibited or hypotonic muscle, reducing episodes of fatigue, contractures, spasms and muscle lesions[13-15].

In Speech-Language Pathology, KT is still used empirically, since scientific research has just started[16]. Its principles are analgesia, tonus adjustment and improvement of muscle function[17-20]. Studies have indicated its benefit in controlling extra oral saliva leakage, since it improves local proprioception and the strengthening of the orbicularis muscle of the mouth[16,17]. In temporomandibular dysfunctions, it promoted analgesia, muscle relaxation, improving blood and lymphatic circulation in the region near the temporomandibular joint (TMJ)[18]. In the treatment of dysphonia, KT reduced tension in the cervical muscles[19] while in swallowing, it improved proprioception and the strengthening of the orofacial muscles[20].

New treatment resources are being used, in a complementary manner to practice in Speech-Language Pathology for FPs, with the goal of optimizing treatment time. Such resources include electrostimulation, photobiomodulation, or elastic bandaging associated with orofacial myofunctional therapy[10-13].

In the case of post-stroke patients' treatment, the hypothesis of this study is that KT promotes the reorganization of facial nerve neurons from sensory stimulation, letting neuronal neuroplasticity to act.

The nervous system (NS) is composed of sensory, motor, and association neurons. The sensory receptors send information to the central nervous system (CNS), where it will be integrated by association neurons, or interneurons, which send an efferent response to the muscle. Therefore, the NS detects external and internal stimuli, both physical and chemical, triggering the muscle responses[16-19]. The cortical areas have the ability to change, adapt, and mold themselves at a structural and functional level, a phenomenon happening as a result of these stimuli[19,20]. Based on this principle, KT would be an external physical stimulus that can promote neuroplasticity of the facial nerve in the CNS through tegumental stimulation of the skin's mechanoreceptors, causing changes in the behavior of muscle motor units and neuronal excitation, i.e., the bandage glued to the skin allows constant stimuli, which are perceived at the cortical level, and produce motor response in the tegumental system, assisting in the neuroplasticity of the central nervous system[19,21].

Since it is a very recent resource in the practice in Speech-Language Pathology, the literature is scarce in studies that standardize the use of elastic bandaging. As a consequence, this study aimed to compare the results of exclusive orofacial myofunctional therapy and when it is associated with the use of KT in the treatment of post-stroke facial paralysis in the acute phase.

METHODS

This is an experimental case-control study, carried out in the Stroke Unit of the Risoleta Tolentino Neves Hospital, with inpatients admitted during the period from October 2017 to August 2018. The study was approved by the Research Ethics Committee of the Federal University of Minas Gerais, under opinion no. 3,082,696. All study participants signed the Informed Consent Form, agreeing to the research terms.

An active search was carried out in the electronic medical records, using ICD 10 - I64 (International Classification of Diseases 10 -I64) 'stroke not specified as ischemic or hemorrhagic', to verify the patients' profile. We included those diagnosed with stroke in the acute phase (within 72 hours of ictus) and facial paralysis, aged over 18 years, with a satisfactory level of consciousness according to the Glasgow scale (score > 13) and language preservation (adequate Language Screening Test - LAST)[21], in addition to having intact facial skin, without scars, warts or sores and no medical contraindication for the procedures performed in this study. We excluded patients with other craniofacial deformities, degenerative diseases, apraxia, cancer diagnosis in the head and neck region, previous history of FP, intubated patients, tracheostomized patients, pregnant patients, patients with facial paralysis not resulting from stroke, and those who, for some reason, did not complete or perform all the procedures used in this study.

In order to select the participants, we collected data from medical charts about neurological reports, computed tomography (CT) results, location and extent of brain lesions, severity of neurological impairment, according to the National Institute of Health Stroke Scale (NIHSS)[22], functional deficit, by means of the Functional Independence Measure (FIM)[23], and orofacial myofunctional alteration by means of the assessment protocol of the service. The possibility of any contraindication to the procedures was also checked with the multidisciplinary team.

To assessment facial paralysis we used the House and Brackmann severity classification protocol for PF[3,24-25] and the movement incompetence protocol, movement incompetence = paralyzed side - normal side x 100/normal side (MI=PS-NS x 100/NS) for facial measurements[26]. House and Brackmann's scale was adapted for the assessment of patients with CFP: at rest, facial symmetry was assessed by analyzing the three thirds of the face; in movement, only the lower third of the face was considered. Although the scale assesses the three thirds of the

face, it is worth mentioning that it showed good intra-rater and inter-rater agreement[25], making it possible to use it to assess the lower third of the face, and for this reason, its use was deemed appropriate in the assessment of CFP.

The assessed muscles were: occipitofrontal, corrugator of super-cilium, pyramidal/transverse nose, upper lip and nose wing lifter, nasal septum depressor, eye orbicular, upper lip lifter, zygomatic major and minor, risorius, mouth angle loweror, mentonian, and lips orbicular. The requested facial movements were "scared face", "angry face", "frown face", "close eyes softly", "close eyes tightly", "open smile", "close smile", "sad face", "pucker", and "pout". The patients were photographed sitting in bed, with natural lighting and distance of approximately 70 centimeters, with a 12 MP *IPhone* 7 cell phone camera, video recording 2160 p and resolution 750 x 1334 px.

During the face measurement procedure, the participants kept their gaze fixed ahead, since looking up and to the sides could alter the values obtained; maximum effort was required for the movements requested during the measurement. All facial mimicry assessment procedures were performed on the same day and always by the same evaluator.

Forty-six subjects with FP participated in the study, consisting of two groups of 23 patients each, randomly allocated; in the case group, treatment consisted of orofacial myofunctional therapy and use of KT on the major and minor zygomatic muscles, while in the control group, it was applied only orofacial myofunctional therapy. Although smiling with the lips open and closed make other muscles contract, for methodological reasons it was decided to apply KT only to the zygomatic major and minor muscles, due to their greater action in the open smile movement, in order to avoid tape overlapping and interference of the bandage on orofacial functions.

In order to check for KT allergy, a piece of approximately five centimeters of tape was applied to the arms of the case group patients for a period of 24 hours. After a negative response, Kinesio Taping was applied in I-shaped strips, with 25% tension in the therapeutic zone, more precisely in the belly of the zygomatic muscles, with the initial anchoring in the malar surface of the zygomatic bone and final anchoring in the angle of the mouth and upper lip, during the patient's hospitalization period (Figure 1). The size of the bandage strip was defined individually, according to the palpatory anatomy of the muscles, considering the anchorage at their origin and insertion. Each participant stayed three consecutive days with the bandage and, after the third day, remained without the use of the bandage for 24 hours for skin rest. After the resting period, a new KT strip was placed on the patient's face by the speech-language pathologist in charge, remaining for three more days, repeating this procedure until the individual completed 12 days of intervention.

Figure 1. Picture of the Kinesio Tape application on the zygomatic major and minor muscles

Both groups underwent a protocol of treatment consisting in orofacial myofunctional movement-inducing maneuvers, with three sessions of ten repetitions of the altered facial movements, three times a day[25,26]. In the morning, the intervention was done by the speech-language pathologist, and in the other periods (afternoon and evening) by the patient and/or companion, who were instructed on how to perform each task, with verbal and written instructions. The patients in the case group were instructed to perform the massages over the Kinesio Tape.

Regarding the movement-inducing maneuvers, all the patients were trained to contract and maintain the contraction of the muscles on both sides of the face, while slow and deep massages were performed in the direction of muscle contraction, only on the paralyzed side[27]. When the muscles started showing movement in the FP re-innervation phase, the isotonic and isometric myofunctional exercises were started with the facial mimic muscles, and the isotonic exercises were as follows: quickly twitch and release the nose, quickly switch closed pucker and smile, quickly switch open pout and smile, all with ten repetitions. The isometric exercises were: twitching the nose, pout with lips closed and then open, smile closed and then open, keeping the movements for five seconds with five repetitions[27]. The proposed tasks were to be performed with the aid of visual feedback (mirror)[6].

After three days of intervention, both the case and control groups underwent new facial expression assessment using the same protocols used in the assessment. All study subjects underwent 12 days in treatment of facial mimicry. The variables considered for data analysis were: movement incompetence by means of facial measurements and the degree of impairment from facial paralysis, as well as to know if age might have influenced the results.

Regarding the descriptive analysis we performed frequency distribution for all categorical variables and analysis of measures of central tendency and dispersion for continuous variables. For the association analysis, we used Student's t test for paired samples, besides Pearson's chi-square test, Fisher's exact test, Wilcoxon's test, and simple ordinal regression. The significance level adopted in all analyses was 5%. IBM SPSS Statistics version 24.0 software was used for data processing and analysis.

RESULTS

Most patients were elderly (52.17%), male (60.87%), ages ranging from 44 to 89 years, average 62.4 years (standard deviation ± 11.7 years), moderate neurological impairment on the NIHSS scale, and modified dependence with assistance in up to 50% on tasks on the FIM scale in both groups. Most individuals (93.48%) had left central facial palsy (63.4%). In

the severity scale, in the case group, moderate FP prevailed (43.48%), followed by severe moderate (21.74%), and in the control group, moderate FP (34.78%), followed by severe (26.09%) and mild (26.09%). The mean time between ictus and the beginning of treatment was 2.96 days (standard deviation ± 2.64 days). Only the gender variable was statistically significant; males were more frequent in the control group, and females were more frequent in the case group; for the other variables the groups were equal (Table 1).

Though the assessment of the face measurements of the two groups, it was possible to notice that there was a significant difference in almost all comparisons between pre- and post-treatment. In all cases, the mean of the measures was higher pre-treatment, and although some measures did not reach statistical significance, their means were also higher pre-treatment. However, by the test, they were considered similar. It was also observed that both the case and control groups showed improved facial asymmetry after of treatment, since movement incompetence was lower in all measures. However, the case group showed greater reduction in MI in the external corner of the eye and lip commissure (CEO-CL) measure, which is the location of the zygomatic muscles that aid in the open smile movement (Table 2).

In both groups there was improvement in facial mimicry after the intervention, signaled by an increase in the number of patients classified with grade I and II facial paralysis. Only in the control group was there a statistically significant difference in the results of moderate dysfunction (grade III) pre and post-intervention. However, it cannot be stated, based on the data in the table, that the control group had a better result compared to the case group, because the groups were not paired by the degree of FP (Table 3) and (Figure 2).

Although in the control group the percentage of improvement was greater there was no statistical relevance, indicating that the two groups obtained similar percentages of improvement in the degree of facial paralysis. (Table 4).

Regarding the analysis whether age could have influenced the results of movement incompetence after the intervention, we found that this variable had no influence on facial measurements (Table 5).

Table 1. Characterization of questionnaires by groups and in total

		Total		Case		Control		p value *
		n	%	n	%	n	%	
Age group	Adult	22	47.83	9	39.13	13	56.52	0.376
	Old man	24	52.17	14	60.87	10	43.48	
Sex	Male	28	60.87	10	43.48	18	78.26	**0.033**
	Feminine	18	39.13	13	56.52	5	21.74	
Stroke Type (HD)	AVCi	44	95.65	22	95.65	22	95.65	0.999
	AVCi with AVCh transformation	2	4.35	1	4.35	1	4.35	
Degree of neurological impairment (NIHHS)	Light	12	26.09	4	17.39	8	34.78	0.278
	Moderate	25	54.35	15	65.22	10	43.48	
	Serious	9	19.57	4	17.39	5	21.74	
Functional independence measure (pre-speech therapy)	Modified dependency with up to 50% assistance on the task	27	58.70	15	65.22	12	52.17	0.707
	Modified dependency with assistance of up to 25% on the task	6	13.04	3	13.04	3	13.04	
	Complete independence / modified pre-intervention	13	28.26	5	21.74	8	34.78	
side of the face affected	Right	17	36.96	10	43.48	7	30.43	0.542
	Left	29	63.04	13	56.52	16	69.57	
Type of facial paralysis	Peripheral	3	6.52	2	8.70	1	4.35	0.999
	Central	43	93.48	21	91.30	22	95.65	
Degree of facial paralysis (pre-speech therapy)	Grade II - Mild Dysfunction	9	19.57	3	13.04	6	26.09	0.600
	Grade III - Moderate dysfunction	18	39.13	10	43.48	8	34.78	
	Grade IV - Moderate Severe Dysfunction	7	15.22	5	21.74	2	8.70	
	Grade V - Severe Dysfunction	10	21.74	4	17.39	6	26.09	
	Grade VI - Total Paralysis	2	4.35	1	4.35	1	4.35	
		median	**Mean (SD±)**	**median**	**Mean (SD±)**	**median**	**Mean (SD±)**	
Age years)		60.5	62.4 (SD±11.7)	65.00	65.7 (SD±10.6)	57.00	59.1 (SD±11.9)	0.057 [1]
Intervention time (days)		2.00	2.96 (SD±2.64)	2.00	2.91 (SD±2.48)	3.00	3.00 (SD±2.84)	0.477 [2]

Source: Stroke Unit of Hospital Risoleta Tolentino Neves

*Chi-Square or Fisher's Exact Test; [1] Student's t test for independent samples; [2] Mann-Whitney Test

Caption: n = number of subjects; stroke = ischemic stroke; AVCh = hemorrhagic stroke; HD = high definition; NIHHS = National Institute of Health Stroke Scale; SD = standard deviation

Table 2. Comparison of facial movement incompetence measures pre and post intervention

Face measurement (cm)		Pre-intervention				Post intervention				Mean difference (pre - post)	P-Value*
		Min	Max	Median	Mean (SD)	Min	Max	Median	Mean (SD)		
Case group (n=23)	IM T-CL	0.00	22.90	11.80	11.76 (5.75)	0.00	15.80	6.20	6.13 (3.88)	5.63	**< 0.001**
	IM CIO-CL	1.00	29.20	7.20	8.29 (6.56)	0.00	59.00	1.60	5.66 (12.36)	2.63	0.357
	IM CEO-CL	1.00	28.30	10.80	11.70 (7.57)	0.00	18.40	3.00	3.71 (4.10)	8.00	**< 0.001**
	IM CIO-NA	0.00	43.70	1.00	5.27 (10.13)	0.00	16.50	0.00	1.57 (3.94)	3.70	**0.023**
Control group (n=23)	IM T-CL	4.60	88.80	11.40	16.31 (17.57)	-4.80	69.40	3.50	8.53 (14.80)	7.78	0.102
	IM CIO-CL	-1.20	22.90	7.60	8.42 (6.14)	0.00	20.90	3.50	4.73 (5.07)	3.70	**< 0.001**
	IM CEO-CL	0.30	33.20	7.20	10.17 (8.36)	-5.40	30.60	3.50	4.97 (7.23)	5.19	**< 0.001**
	IM CIO-NA	0.00	30.90	5.10	7.94 (8.49)	0.00	27.50	2.60	4.11 (5.90)	3.83	**0.012**

*Student's t test for paired samples

Subtitle: n = subjects; min = minimum; max = maximum; SD = standard deviation; IM = incompetence of movement; T-CL = Targus and lip commissure; CIO-CL = Inner corner of eye and lip commissure; CEO-CL = Outer corner of the eye and lip commissure; CIO-NA = Inner corner of the eye and nasal angle

Table 3. Degree of impairment of facial paralysis pre and post intervention

	Degree of facial paralysis (House & Brackmann Score)	Pre-intervention		Post-intervention		p-Value*
		n	%	n	%	
Case group (n=23)	Grade I – Normal	0	0.00	2	8.70	0.489
	Grade II –Mild Dysfunction	3	13.04	7	30.43	0.153
	Grade III –Moderate Dysfunction	10	43.48	7	30.43	0.359
	Grade IV –Moderately Severe Dysfunction	5	21.74	4	17.39	0.999
	Grade V - Severe Dysfunction	4	17.39	3	13.04	0.999
	Grade VI –Total Paralysis	1	4.35	0	0.00	0.999
Control group (n=23)	Grade I – Normal	0	0.00	4	17.39	0.109
	Grade II - Mild Dysfunction	6	26.09	9	39.13	0.345
	Grade III - Moderate Dysfunction	**8**	**34.78**	2	8.70	**0.032**
	Grade IV - Moderately Severe Dysfunction	2	8.70	3	13.04	0.999
	Grade V - Severe Dysfunction	6	26.09	5	21.74	0.730
	Grade VI - Total Paralysis	1	4.35	0	0.00	0.999

*Chi-square or Fisher's exact test

Subtitle: n = number of subjects

Table 4. Analysis of the improvement of the degree of facial paralysis after speech therapy intervention

Post-Intervention Facial Paralysis Degree	Case Group		Control Group		p-Value**
	n	%	n	%	
Improved	12	52.17	15	65.22	
Worsened	0	0.00	0	0.00	0.550
Kept	11	47.83	8	34.78	
Value p*	**< 0.001**		**< 0.001**		

*Wilcoxon test; **Pearson's chi-square test

Subtitle: n = number of subjects

Table 5. Association between facial movement incompetence and age

Dependent Variable - Age	Case group (n = 12)				Control group (n=15)			
	OR	Value p*	95% confidence interval for OR		OR	p-Value*	95% confidence interval for OR	
			Inferior limit	Upper limit			Inferior limit	Upper limit
IM T-CL	- 0.224	0.647	-1.281	0.832	0.236	0.729	-1.243	1.716
IM CIO-CL	0.456	0.172	-0.235	1.147	0.004	0.983	-0.366	0.373
IM CEO-CL	0.501	0.140	-0.196	1.197	-0.176	0.750	-1.376	1.023
IM CIO-NA	0.330	0.132	-0.118	0.779	1.583	0.076	-0.203	3.369

*Simple linear regression

Subtitle: OR = *Odds Ratio*; T-CL = Targus and lip commissure; CIO-CL = Inner corner of eye and lip commissure; CEO-CL = Outer corner of the eye and lip commissure; CIO-NA = Inner corner of the eye and nasal angle

Figura 2. (A) Before Kinesio Tape application; (B) Two weeks after the beginning of the use of Kinesio Tape

DISCUSSION

This is the first study investigating orofacial myofunctional therapy alone, as well as associated with the use of KT in the treatment of post-stroke facial paralysis in the acute phase, and there was no difference between the groups of patients.

Practice in Speech-Language Pathology in the treatment of facial paralysis not only aims towards the reduction of asymmetry, but also acts on the function that these muscles have in the stomatognathic system[20]. The use of KT bandaging in treatment is indicated to promote muscle work, generating direct benefits on orofacial functions. KT is not a treatment, but an additional resource that complements the techniques used, because of its continuous action, enhancing the results of traditional therapy and helping in the stimulation of neuroplasticity[16].

The studies that investigated the effects of KT use in the treatment of patients with neurological dysfunctions showed that the main benefits were the improvement in proprioception and the normalization of muscle function where the bandage was applied[8-14]. Modifications in the central nervous system (CNS) are accomplished by sensory and motor stimuli, experiences, and learning. Thus, the elastic bandage acts as a source of sensory stimulus, seeking to recover or improve movement performance. The somatosensory stimulus can activate several receptors, and it is up to the CNS to interpret their activity and use them to generate new perceptions13. Therefore, the use of KT in the acute post-stroke phase is an additional resource to orofacial myofunctional therapy, as it is an external stimulus that can promote neuroplasticity of the facial nerve, promoting axonal regeneration.

Regarding the percentage of reduction in the degree of facial paralysis, most patients who showed improvement were from the control group. This is due to the greater number of individuals with a milder degree of pre-intervention FP and, consequently, improvement in facial symmetry is achieved in less time.

There was significant improvement in motion incompetence (MI) post-intervention in the case and control groups, a finding that reinforces what the literature has already advocated about the effectiveness of orofacial myofunctional therapy in the treatment of these patients.

Several studies have described the benefits of orofacial myofunctional treatment in FP, since it is possible to promote a reduction in facial asymmetry, improved feeding, speech, and emotional problems, thereby reducing the negative impacts on the quality of life of these individuals[26-29].

Early intervention is an indication of good prognosis in the treatment of FP[27-28], helping to restore the mobility and functions of the orofacial muscles, thus reducing muscle atrophy and the appearance of synkinesis and contractures[21]. In this aspect, the action of treatment in this study benefited from the possibility of early clinical diagnosis of the FP and the quick beginning of treatment, still in the acute phase of the stroke.

In this study, no significant difference was observed between the use or not of KT in the treatment of patients with FP post-stroke. This factor can be justified by the short time of patients' follow-up, since the average time for treatment of facial paralysis is three to 12 months, according to the benchmark of time of treatment in practice in Speech-Language Pathology, and the time of hospitalization in the stroke unit, around 15 days[30].

It is worth mentioning that the results of this study suggested that KT may be an additional resource used to promote return to facial mimicry after stroke. In the group in which KT was applied to the zygomatic major and minor muscles, the mean pre and post-intervention movement incompetence showed the greatest difference, indicating good therapeutic response, although without statistical relevance. This result should be better investigated in future studies and with longer patient follow-up in order to verify whether KT associated with orofacial myofunctional therapy does indeed improve movement incompetence when compared to the use of traditional practice in Speech-Language Pathology treatment strategies.

It is important to note that the application of KT to the face differs from its application to other muscles of the human body[8-13] because the orofacial muscles are composed of thin cutaneous muscles which, in general, are smaller than the other body muscles and closer to each other, forming a complex muscle group to be worked on[26-29]. For that reason the question posed is: in the case of facial paralysis, would it be more beneficial to band the muscles in isolation or to band the muscle group responsible for a certain movement of the facial mimicry? Does the way the banding was applied interfered in the results found in this sample? To answer these questions, there is a need of

studies that address the biomechanics of KT application on the orofacial muscles.

We did not find in the literature any studies that have used KT in the treatment of FP, as well as a reduced number of publications that approach CFP, when compared to publications about PFP. We chose to start the bandaging studies in patients with post-stroke FP in the acute phase, because it would be more reliable to control the performance of the proposed exercises in hospitalized patients, since the speech-language pathologist could perform daily exercises at the bedside, which would not be possible with the patient at home. This is a situation in which the professional would have to rely on the patient's report about the performance of the proposed tasks. In addition, we emphasize the importance of investigating in this population, techniques that promote neuroplasticity and early intervention, a good prognostic factor to reduce the rate of morbidity and disability.

This study is an important warning about the need for research to standardize this resource in the treatment of facial paralysis. It is noteworthy that the use of the face measurement protocol[26] allowed us to quantify the movement incompetence and to compare the action of the muscles that received KT in pre- and post-treatment phases, making the results reliable and allowing objective comparisons with future studies. The possibility of new studies with a larger number of patients and treatment time, as well as other assessment protocols, such as electromyography, complementing these findings, is relevant and necessary.

Speech-language pathologist have used different technological resources, that need to be further studied[16], in order to use scientific evidence as the basis of these new treatment methods.

CONCLUSION

There was no statistically significant difference between orofacial myofunctional therapy alone or associated with the use of Kinesio Taping in the treatment of facial paralysis after ischemic stroke in the acute phase. Both methods have been shown to be effective in treating facial mimicry impairment and, therefore, elastic banding can be used in association with orofacial myofunctional therapy in post-stroke facial paralysis.

ACKNOWLEDGEMENTS

We are grateful to our patients and colleagues of the Risoleta Tolentino Neves Hospital, for their willingness and interest in the scientific research.

REFERENCES

1. Calais LL, Gomez MVSG, Bento RF, Comerlatti LR. Mime functional evaluation in facial paralysis following a stroke. Pro Fono. 2005;17(2):213-22. http://dx.doi.org/10.1590/S0104-56872005000200010. PMid:16909531.

2. Pimenta E, Costa A, Buke MJ. Strategies for Recovering facial expression after central facial paresis. RIASE. 2019;5(1):1691-706. http://dx.doi.org/10.24902/r.riase.2019.5(1).1691.

3. Konecny P, Elfmark M, Horak S, Pastucha D, Krobot A, Urbanek K, et al. Central facial paresis and its impact on mimicry, psyche and quality of life in patients after stroke. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2014;158(1):133-7. http://dx.doi.org/10.5507/bp.2013.014. PMid:23558454.

4. Pereira, KJ, Rios MJBL, Silva DR, Silva MRDCD, Ribeiro JM, Barbosa IS. Physiotherapy in facial paralysis. ReonFacema. 2018;(4):1339-43.

5. Silva MFF, Brito AFD, Campos MF, Cunha MC. Multidisciplinary care of peripheral facial palsy: clinical case study. Distúrb Comum. 2015;27(2):364-8.

6. Souza IF, Dias ANM, Fontes FP, Melo LP. Physical therapy methods used in the treatment of peripheral facial paralysis: a review. Rev Bras Ciênc Saúde. 2015;19(4):315-20.

7. Guimarães SS, Ferreira DM, Silva AM, Silva AT, Kosour C, Reis LM. Effect of Taping with or without FES and vibration in dorsiflexion and weight bearing after stroke. Rev Neurocienc. 2015;23(3):383-9. http://dx.doi.org/10.4181/RNC.2015.23.03.1026.06p.

8. Henriques LFDM, Wnderley D, Lima DLP, Filho AGM, Oliveira DAD. Kinesio taping on the balance gain in patients after stroke. Braz J Hea Ver. 2019;2(1):290-303.

9. Pereira AA Jr, Butzke J, Persuhn JJ. Kinesio Taping® in association with kinesiotheraphy on gait correction of after stroke. Rev Pesqui Fisioter. 2016;(1):73-82.

10. Magalhães HCCDG, Menezes KKPD, Avelino PR. Efeitos do uso do Kinesio® Taping na marcha de indivíduos pós-acidente vascular encefálico: uma revisão sistemática com metanálise. Fisioter Pesqui. 2017;24(2):218-28. http://dx.doi.org/10.1590/1809-2950/17387024022017.

11. Hu Y, Zhong D, Xiao Q, Chen Q, Juan L, Jin R. Kinesio Taping for balance function after stroke: a systematic review and meta-analysis. CAM. 2019;2019:8470235.

12. Morini N Jr, Santos SMS, Caramello AG, Maidana MG, Aquiahuatl CM, Silva APD, et al. Bandagem terapêutica: conceito de estimulação tegumentar. 2a ed. São Paulo: Editora Roca; 2016.

13. Araújo GJS, Rodrigo AS, Cavalcante MLC, Moraes MRB. A aplicabilidade do recurso Kinesio Taping® nas lesões desportivas: uma revisão de literatura. Rev Pesqui Fisioter. 2014;4(3):189-96.

14. Lemos TV, Pereira KC, Protássio CC, Lucas LB, Matheus JPC. The effect of Kinesio Taping on handgrip strength. J Phys Ther Sci. 2015;27(3):567-70. http://dx.doi.org/10.1589/jpts.27.567. PMid:25931682.

15. Vithoulka I, Beneka A, Malliou P, Aggelousisb N, Karatsolisa K, Diamantopoulos K. The effects of kinesio-taping on quadriceps strength during isokinetic exercise in healthy non athelete women. Isokinet Exerc Sci. 2010;42:11-6.

16. Silva AP, Escamez NES, Morini N Jr, Silva MAA. Therapy Taping® Method: therapeutic taping as a therapeutic resource in the Speech Language clinical practices. Distúrb Comun. 2014;26(4):805-8.

17. Sordi C, Araújo BL, Cardoso LVD, Correia LAV, Oliveira GM, Silva SSS, César CPHAR. Elastic bandage as a therapeutic resource for the control of sialorrhea: an analysis of its efficacy. Distúrb Comum. 2017;29(4):663-72.

18. Hernandes NCJ, Ribeiro LL, Gomes CF, Silva AP, Dias VF. Speech therapy in temporomandibular dysfunction in two cases: comparative analysis of the effect of traditional therapy and the use of the therapeutic bandage associated. Distúrb Comun. 2017;29(2):251-60. http://dx.doi.org/10.23925/2176-2724.2017v29i2p251-261.

19. Mezzedimi C, Livi W, Spinosi MC. Kinesio Taping in Dysphonic Patients. J Voice. 2017;31(5):589-93. http://dx.doi.org/10.1016/j.jvoice.2017.01.012. PMid:28237552.

20. Mota DVN, Silva LVC. Use of functional bandages in patients with stroke. Fisioter Mov. 2014;27(3):329-36. http://dx.doi.org/10.1590/0103-5150.027.003.AO03.

21. Ramos RDL. Adaptação cultural e validação do "The Language Screening Test- LAST" versões a e b para o português do Brasil [dissertação]. Campinas: Faculdade Ciências Médicas da Universidade Estadual de Campinas – UNICAMP; 2013.

22. Cincura C, Pontes-Neto OM, Neville IS, Mendes HF, Menezes DF, Mariano DC, et al. Validation of the national institutes of health stroke scale modified Rankin Scale and Barthel index in Brazil: the role of cultural adaptation and structured interviewing. Cerebrovasc Dis. 2009;27(2):119-22. http://dx.doi.org/10.1159/000177918. PMid:19039215.

23. Riberto M, Miyazaki MH, Jucá SSH, Sakamoto H, Pinto PPN, Battistella LR. Validation of the Brazilian version of functional independence measure. Acta Fisiatr. 2004;11(2):72-6. http://dx.doi.org/10.5935/0104-7795.20040003.

24. House JW, Brackmann DE. Facial nerve grading system. Otolaryngol Head Neck Surg. 1985;93(2):146-47. http://dx.doi.org/10.1177/019459988509300202. PMid:3921901.

25. Fonseca KMO, Mourão A, Motta AR, Vicente LCC. Scales of degree of facial paralysis: analysis of agreement. Braz J Otorhinolaryngo. 2015;81(3):288-93. http://dx.doi.org/10.1016/j.bjorl.2014.04.005. PMid:25497850.

26. Quintal M, Tessitore A, Paschoal JR, Pfeilsticker LN. Facial paralysis quantification by digital paquimeter. Rev CEFAC. 2013;15(3):592-8.

27. Miranda VHM, Scarpel VR, Torres ACM, Agra IMG. Effectiveness of speech therapy in patients with facial paralysis after parotidectomy. Rev CEFAC. 2015;17(3):984-95. http://dx.doi.org/10.1590/1982-021620157314.

28. Romão AM, Cabral C, Magni C. Early speech therapy intervention in a patient with facial paralysis after otomastoiditis. Rev CEFAC. 2015;17(3):996-1003.

29. Tessitore A, Pfelsticker LN, Paschoal JR. Neurophysiologic aspects of facial musculature aiming at rehabilitation of Facial Paralysis. Rev CEFAC. 2008;10(1):68-75. http://dx.doi.org/10.1590/S1516-18462008000100010.

30. Mourão AM, Vicente LCC, Chaves TS, Sant'Anna RV, Meira FC, Xavier RMB, et al. Profile of patients with a diagnosis of stroke attended at a hospital in Minas Gerais accredited in the care line. Rev Bras Neurol. 2017;53(4):12-6.