PILOT STUDY

Effects of Kinesio Taping Compared with Manipulation Therapy on Drooling and Speech Intelligibility in Children with Oral Dysphagia: A Pilot Study

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ABSTRACT

Objective • To determine the effectiveness of Kinesio Taping (KT) and Manipulation Therapy (MT) on drooling and speech intelligibility in children with oral dysphagia.

Methods • A randomized clinical trial was conducted at Helping Hand Institute of Rehabilitation Sciences in Mansehra, Pakistan. A total of 20 patients were recruited via the random sampling technique and later assigned to one of two groups: KT (n=10) or MT (n=10). Every patient in both groups received their intervention 5 days a week for 1 month (20 sessions total), and each session lasted 45 minutes. Data was collected and analyzed at baseline and 1 month. Drooling was assessed via the Modified Teachers' Drooling Scale and speech intelligibility determined via the 7-Point Intelligibility Rating Scale. Mann Whitney U-test was used for between-group comparisons and for within-group comparisons the Wilcoxon signed-rank test and their effect size was used.

Results • The mean age of study patients was 5.4 years. Of the 20 patients, 14 were male and 6 were female. Within-group comparisons showed significant improvement in both drooling and speech intelligibility ($P < .05$), while between-group comparisons showed no significant difference ($P \geq .05$) in either the KT or MT group regarding drooling severity and speech intelligibility.

Conclusion • KT and MT significantly improved drooling and speech intelligibility. (*Altern Ther Health Med.* 2022;28(3):48-51).

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INTRODUCTION

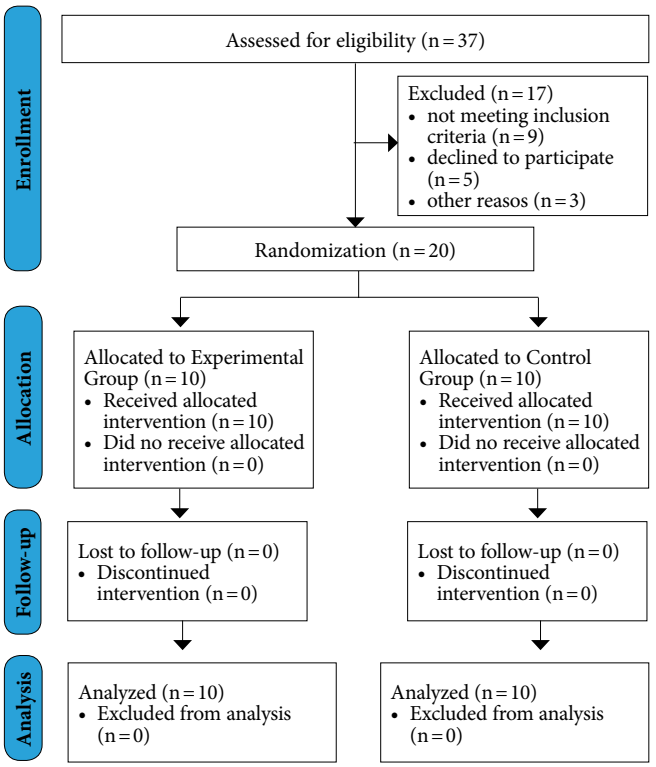
Drooling is defined as the unintentional loss of saliva from the mouth that usually occurs due to weakness of orofacial and palate-lingual musculature, mostly associated with neurodegenerative disorders.[1] Increased production of saliva isn't just associated with drooling; in fact, in many cases it has been observed that saliva production is normal.[2] It affects 10% to 38% of children with cerebral palsy (CP).[3] The burden of neurodegenerative disorders has been increased and affects up to 6.5% of the population worldwide. Moreover, 4% to 5% of the population is affected in low-income countries including Pakistan, while 10% to 11% are affected in high-income countries. However, the prevalence is still unknown in Pakistan.[4]

Drooling leads to issues with socialization, social relationships, and in addition affects the hygiene of patients and their caregivers.[3] It also causes skin disintegration or dryness, infection, disrupted speech and patients may also develop aspiration pneumonia.[2] Drooling worsens speech intelligibility,[5] which compromises the hearer's ability to understand, and results in a loss of interest and increased anger and disappointment for the patient. Due to these issues, communication decreases and may lead to isolation.[6]

Drooling is directly and significantly associated with oral dysphagia.[6,7] Also, children with drooling issues have low oral sensation scores. Children with CP with drooling issues have poor synchronization of lip closure and ineffectual and uncoordinated swallowing.[8]

Different treatment approaches are being used, including medications, surgery, botulinum toxin A injections, radiotherapy, oral motor training, speech therapy, behavior therapy and sometimes a combination of therapies.[9] Drooling

Figure 1. Consort Diagram



can also be managed by therapeutic exercises of the orofacial muscles.[10] In the past few years, Kinesio Taping (KT) and Manipulation Therapy (MT) is also being used for the management of drooling.[10,11,12]

There is a paucity of research regarding the effectiveness of KT and MT in the management of drooling. This is the first study in which both therapies were evaluated for the management of drooling and intelligibility in children with CP with oral dysphagia, in order to reduce the clinical and functional consequences for both patients and their caregivers.

MATERIALS AND PATIENTS

This was a randomized clinical trial (NCT04266626) conducted at Helping Hand Institute of Rehabilitation Sciences, in Mansehra, Pakistan, after receiving approval from the ethical review committee (ERC), for a duration of 6 months from March to August 2020.

Inclusion Criteria

Both males and females with different non-degenerative neurological disabilities (CP traumatic brain injury, childhood stroke) and having oral phase dysphagia of age between 2.5 and 11 years were included in the study. The children had a drooling severity rating of ≥4 on the Modified Teacher's Drooling Scale, were able to comprehend simple verbal commands and had 3-word sentence level speech and had good head control. Parents and caregivers of children with drooling and oral phase dysphagia were also included in the study.

Exclusion Criteria

Children with a structural abnormality of the respiratory system, a corrected or uncorrected cleft palate or cleft lip, recent surgery or taking any medication or on any treatment to control drooling were excluded from the study.

METHODS

The mean age of study patients was 5.4 years. A total of 20 patients participated in the study, 18 of whom had CP and 2 had childhood stroke. Regarding gender distribution in the study, a total of 14 males and 6 females participated in the study as shown in Figure 1. The 20 patients were randomly assigned to one of two groups: the KT group or the MT group, as shown in Figure 1. Every participant in both groups received their intervention for 1 month.

KT was used 5 days a week for 45 minutes. The procedure included cutting 2 "I" tapes according to the structure of the patient's lip muscles. While maintaining 10% tension, the tape was applied to the muscles in the corner of the upper lip with the mouth fully open.

MT was provided 5 days a week for 45 minutes. The patients received oral motor manipulation therapy including tapping, massage and rhythmic pressure.

In order to maintain good seated posture, a CP chair was used for the patients. The trunk was in the upright position within the cutout lap board of the CP chair. Shoulders and arms rested in symmetrical manner on the lap board, and a footrest was used in order to maintain good posture and control any foot movements. Hips, knees and ankles were flexed to 90 degrees. Each participant received three 15-minute sessions per day. The comfort level of the patients was considered before applying rhythmic pressure around the lips and base of the tongue muscles. Tapping was performed around all the lip muscles (orbicularis oris) for 5 minutes (150 times). Finger massage was applied around the lip muscles: starting from the midline of the lips, holding both lips with 2 fingers of both hands, then towards the jaw bone, and around the base of the tongue with the help of the thumb for 5 minutes. Parents were also given training in manipulation exercises and a home exercise plan.

RESULTS

Data was collected at baseline and at 1 month. Demographic data including age, gender and type of disorder was collected at baseline. The severity of drooling was measured by the modified Teacher's Drooling Scale (mTDS)[13] and speech intelligibility was measured by the 7-Point Intelligibility Rating Scale.[14]

The results were presented as frequency, percentages, mean ± standard deviation (SD), median (IQR), effect size (r) and *P* values. As the scales were ordinal and violated the assumption of parametric tests, for between-groups comparison the Mann Whitney U-test was used, and for within-group changes the Wilcoxon signed-rank test was used. Significance level was set at a *P* value < .05. IBM® SPSS 21 software was used to analyze the data.

Statistical Analysis

Wilcoxon signed-rank test showed that at 1 month, 5 days/week KT and MT management both significantly improved drooling severity with large (7.5[2] vs 6[2.25]; $Z = -2.842$; $P = .004$; r = -0.89) and medium effect size (7.5[1.25] vs 5.5[2]; $Z = -2.236$; $P = .025$, respectively. The speech intelligibility significantly improved in the KT group (5[1.25] vs 5[1]; $Z = -2.449$; $P = .014$; r = -0.77] with medium effect size, but in the MT group no statistically significant ($P = .317$) change was observed (see Table 1).

The Mann Whitney U-test showed no significant difference between the KT and MT groups regarding drooling severity ($P = .06$) and speech intelligibility ($P = .07$) after 1 month of management (see Table 2).

Table 1. Within-Group Changes in Drooling Severity & Speech Intelligibility

			Median	IQR	*Z*	*P* value	R
Kinesio Taping (KT)	Drooling Severity	Baseline	7.5	2	-2.842	.004[a]	-0.89
		1 month	6	2.25			
	Speech Intelligibility	Baseline	5	1.25	-2.449	.014[b]	-0.77
		1 month	5	1			
Manipulation Therapy (MT)	Drooling Severity	Baseline	7.5	1.25	-2.236	.025[c]	-0.70
		1 month	5.5	2			
	Speech Intelligibility	Baseline	7	1.25	-1	.317	-0.31
		1 month	6	2			

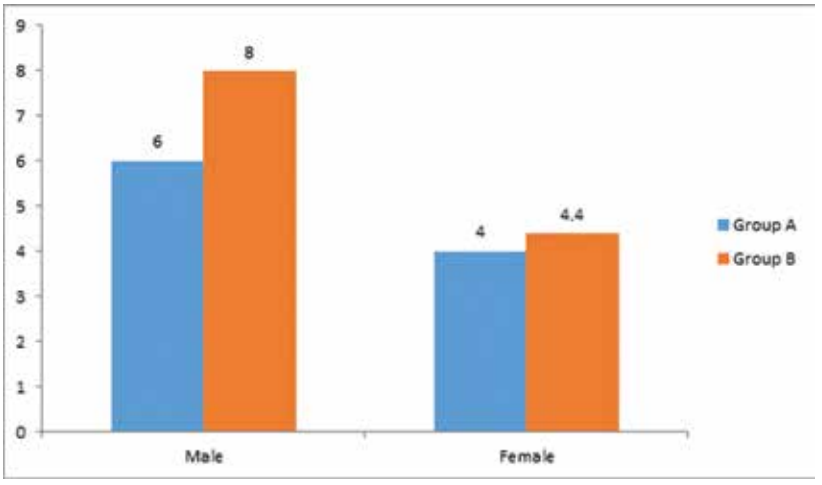
Note: Correlation coefficient (r) for effect size.

[a]$P < .01$
[b]$P < .001$
[c]$P < .05$

Table 2. Comparison between both Groups (Severity & Speech Intelligibility)

		Kinesio-Taping (KT)		Manipulation Therapy (MT)				
		Median	IQR	Median	IQR	U-stat	*Z*	*P* value
Drooling Severity	Baseline	7.5	2	7.5	1.25	43	-0.551	.631
	after 1month	6	2.25	5.5	2	27	-1.83	.067
Speech Intelligibility	Baseline	5	1.25	7	1.25	49	0.08	.935
	1 month	5	1	6	2	27.5	-1.797	.072

Figure 2. Gender of study patients in both groups.



DISCUSSION

The objective of our study was to determine the effectiveness of KT and MT on drooling severity and speech intelligibility in patients with oral dysphagia. According to the results, both therapies were effective in the management of drooling severity, while for speech intelligibility only KT was effective.

In our study, drooling was significantly improved in patients treated with KT. The main cause of drooling is insufficient closure of the lips and decreased or absent oral and perioral sensations, which badly affects the movements of the tongue, causing further fatigue due to overstretching of the orbicularis oris. A 2017 study by Awan, et al, showed that KT alone is an effective approach for decreasing the severity of drooling, which is in accordance with our findings.[15] KT keeps the tissues aligned in the proper position, providing positional stimulus of the skin, and increased stimulation of the mechanoreceptors of skin, which in turn stimulates and limits movement.[16] In addition, the orbicularis oris muscles help with mouth closure. So, KT of the orbicularis oris facilitates closure of the mouth and improves drooling and oral motor control[17] by giving continuous stimulus to skin mechanoreceptors. It may facilitate movement of the muscles and provides precise information about the position of the lips and their movements.[16] Thus, KT is an effective approach to the management of drooling,[15] which is in concordance with the findings of our study.

In addition, KT significantly improved speech intelligibility on the 7-Point Intelligibility Rating Scale, which is in agreement with Mikami, et al, who found that KT significantly improves oral motor skills.[18] Also, drooling is positively correlated with speech intelligibility.[19] As KT improves drooling, speech intelligibility is also improved, which supports the research that better the drooling is treated, better speech intelligibility is.[5]

Moreover, manipulation including taping, massage, and rhythmic pressure showed significant improvement in drooling severity on mTDS. In a previous study, MT was found to be an effective approach for drooling and

oral motor control, [10] which might be improved through sensory awareness, voluntary control of movements and orofacial tone, all of which improve speech intelligibility.[12] But this study showed no significant improvement in speech intelligibility. The reports in the literature showed short-term benefits of MT but with no adverse events,[10] while some research also showed long-term benefits of saliva control. On the other hand, rhythmic pressure reportedly had harmful effects if applied inadequately.[12,20]

Study Limitations

This was a pre-feasibility study of short duration and limited sample size, and therefore the results may be confounded by these limitations.

CONCLUSION

Both KT and MT are effective in reducing drooling severity; however, KT is only effective in improving speech intelligibility in children with CP with oral dysphagia.

On the basis of this study, an interventional model is feasible for conducting a future study with prolonged duration as well as a large sample size to compare the effectiveness of both techniques.

CONFLICT OF INTEREST

None.

FUNDING DISCLOSURE

None.

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