ORIGINAL ARTICLE

Effects of Sustained Stretching with and without Kinesio Tapping in Relieving Spasticity in Spastic Cerebral Palsy

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ABSTRACT

The study was conducted to determine the effect of sustained stretch with and without kinesio tapping in spastic cp, Total of 28 patients were taken from Physiofitt blue area, Islamabad and Al-Nafees Medical College Hospital Islamabad. The data was collected through convenient sampling and patients were allocated randomly via lottery method. This study was initiated after approval from advanced study & research committee (ASRC) of Isra Institute of Rehabilitation Sciences, Isra University, Islamabad. The results in MAS score between KT group and non KT group in 0, 2nd and 4th week assessment were non-significant with the p-value of 0.57, 0.80 and 0.33 respectively and among non KT group and KT group 0, 2nd and 4th week assessment in ROM dorsiflexion the results were also non-significant with p- value 0.40, 0.07 and 0.059 respectively. Repeated measure ANOVA showed that in MAS score of non KT group the results were significant with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.03 and p-value between 0 and 2nd week assessment is 0.03 while in KT group the p-value between 2nd and 4^{th}week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01. Repeated measure ANOVA in ROM dorsiflexion in non KT group shows the significant results with the p-value between 2nd and 4th week assessment is 0.00, p-value between 0 and 4th week assessment is 0.00 and p-value between 0 and 2^{nd}week assessment is 0.00 while KT group also showed significant results with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01. Null hypothesis is accepted

Keywords: Cerebral Palsy, spasticity, sustained stretching, Kinesio taping, spastic cerebral palsy

INTRODUCTION

Cerebral Palsy is basically caused by non-progressive disturbances of the infant or infant brain. Some risk factors for cerebral palsy may include Chorioamnionitis (inflammation of the umbilical cord or placenta), blood clotting disorder, viruses, prematurity, infection, trauma, the complication of delivery, labor (rare), and low birth weight. Spasticity is one of the most critical problems of cerebral palsy. Spasticity can lead to a reduced range of joint motion, muscle shortness, and functional mobility disorder. Treatment for cerebral Palsy mainly depends on the patient's conditions and symptoms and mainly includes physical therapy, medications, and surgery.

Physical therapy, medications, and surgery are used to treat cerebral palsy. Kinesio Tape is a tape made up of cotton fibers that are latex-free and has no medicinal effect.

Cerebral Palsy is the most prevalent and familiar motor disability in children. A study conducted showed that Cerebral Palsy affects about 1.5 to 4 per 1,000 born children. Moreover, the ADDM (CDC'S Autism and Developmental Disabilities Monitoring Network) estimates that about 1 in every 323 children has cerebral palsy[4]. Studies say that Cerebral Palsy is more prevalent among boys as compared to girls. Moreover, it is prevalent in Black children as compared to White children. These diseases also likewise affect Hispanic and White children. Among these affected children, about 77.4% are identified as patients with spastic cerebral palsy, and about 58.2% are classified as children who can walk independently. Moreover, many of these patients suffer from co-occurring conditions, such as 41% experiencing co-occurring epilepsy, while 6.9% experience co-occurring ASD[8]. Cerebral Palsy is prevalent among many societies globally, and the overall prevalence is 2.11 out of every 1000 infants. The prevalence of CP was also higher in babies with low weight. Babies born within 1000-1499 g were affected with CP the most (51.98 per 1000), while babies above 2500g were the least affected by CP (1.33 per 1000). Prevalence among babies less than 1000g was not much different from those with 1000-1499g. Babies with 100-2000g were also affected by CP but very little.

Prevalence in Pakistan is 1.22 per 1000 births in KPK. Children of ages nine-ten were the most affected. There was also an increase in severe cerebral palsy cases.

A patient with cerebral Palsy requires long-term treatment with extra care. Different therapies and medications are being used for the treatment. Treatment could help the patient live an everyday life by improving his nervous and musculoskeletal system. Although it cannot be cured after brain damage, treatment could improve his daily life.

The cerebral Palsy mainly affects the cerebral cortex of the brain. The physical therapist's primary goal is to provide rehabilitation to cerebral palsy patients, such as eliminating the spasticity in the patients. This can be done by sustained stretching. In this, the physical therapist performs the stretching to allow only one repetition. This helps to reduce the spasticity by stretching the muscles. Sustained stretch can be performed along with Kinesio taping. Kinesio Tape is a therapeutic tape that is useful to support and lessen pain in the muscles, ligaments, and joints. When Kinesio tape is appropriately applied, then the Kinesio Tape's elasticity lifts and tightens the skin from ad the tissues.

This Kinesio tapping is applied to the calf muscles to reduce the spasticity and increase gastrocnemius, plantaris, and soleus. After tapping, sustained stretching is performed. Sustained stretching is a typical physical therapy for reducing the spasticity of the adults and children with Cerebral Palsy spasticity. This continuous stretching causes the activation of the Golgi tendon organs and inhibits alpha motor neurons' excitation.

This study mainly focuses on eliminating spasticity in cerebral palsy patients by observing the effects of sustained stretching with and without Kinesio taping. The research is carried out to find the most effective method between these two for the CP patients and effective management techniques.

METHODOLOGY

This study was initiated after approval from advanced study & research committee (ASRC) of Isra Institute of Rehabilitation Sciences, Isra University, Islamabad. A total of 30 cases of spastic cp from Physiofitt Blue Area Islamabad and Al-Nafees Medical College Hospital Islamabad, satisfying the inclusion and exclusion criteria were taken

Study Design

Randomized control Trial

Clinical study in two groups:

- Sustained stretching

- Sustained stretching with inhibitory kinesio taping

Data Analysis: The results of study was presented as frequency, percentages, mean±SD ,p-value and range of motion. To determine effectiveness of sustained stretching with and without inhibitory kinesio tapping, data was calculated by applying independent paired t test and repeated measure ANOVA. The data was analyzed through SPSS 21.

Inclusion Criteria:
- Spastic cerebral palsy patients Diagnosed case

- Patients between ages of 2-10 years
- Both genders
- Patients with MAS score between 1+ and 3

Exclusion Criteria:
- Cerebral palsy patients other than spastic CP
- Cerebral Palsy patients with any contractures
- Cerebral palsy patient with any Lower limb fracture
- Cerebral Palsy Patient with any lower limb deformity

Treatment plan

CONTROL GROUOP	INTERVENTIONAL GROUP
- Individual was pre-tested to measure grade of spasticity - Moist Heat (10 min) on calf muscles. - EMS (5 min) on ankle dorsiflexors. - Sustained stretching of calf muscles. Frequency of stretch was 3 sets with 5 repetitions and hold for 15-30 seconds. - Participant was scheduled to attend 20 treatment sessions (5 sessions every week for 4 weeks,35 mints each session) - Assessment was done on 0 week, 2nd week and 4th week	- Moist heat (10 min) on calf muscles. - EMS (5 min) on ankle dorsiflexors - Sustained stretching of calf muscles. Frequency of stretch was 3 sets with 5 repetitions and hold for 15-30 seconds. - Tape was applied from insertion to origin of respective muscle, with muscle in partially stretched position - Tape was applied with 45-60% of tension - Patient was taped for about 48 hours - Participant was scheduled to attend 12 treatment session (3 sessions every week for 4 weeks, 35mints each session) - Assessment was done on 0 week, 2nd week and 4th week.

RESULTS

A patient with cerebral Palsy requires long-term treatment with extra care. Different therapies and medications are being used for the treatment depending on the condition of the patient.

In current study participants were randomly divided into two groups. Group 1 is Non KT group included 14 patients and Group 2 is KT group included 14 patients with age group 2-10 years. Non KT group received sustained stretch protocol with 10 minutes moist heat on calf muscles and 5 minutes EMS on ankle dorsiflexors each patient was scheduled to attend 20 treatment sessions (5 sessions every week for 4 weeks, 35 mints each session) while KT group received the same baseline treatment and tape was applied from insertion to origin with muscle in partially stretched position. Patient was taped for about 48 hours. Each patient was scheduled to attend 12 treatment session (3 sessions every week for 4 weeks, 35mints each session) Assessment was done on 0 week, 2nd week and 4th week. Modified Ashworth Scale and Range of motion of dorsiflexion were used to measure the effects of treatment. Independent T test and repeated measure ANOVA were used to calculate results.

Table 1 shows that mean age of participants was 4.75±2.90years, mean height of participants was 37.28±9.30inches, mean weight was 39.58±21.99pounds and BMI was 19.5±64.725kg/m

Table 1: (KT Group)

	Minimum	Maximum	Mean±SD
Age	2	10	4.57±2.90
Height (inches)	26	58	37.28±9.30
Weight (pounds)	17.60	105.20	39.58±21.99
BMI(kg/m2)	12.60	25.80	19.56±4.725

Table 2 shows that mean age of participants was 5.82±1.937years, mean height of participants was 38.42±9.204inches, mean weight was 46.78±23.77pounds and BMI was 23.03±10.18kg/m2

Table 2: (Non-KT Group)

	Minimum	Maximum	Mean±SD
Age	2	10	5.82±1.937
Height (inches)	24	56	38.42±9.204
Weight (pound)	24.25	97.34	46.78±23.77
BMI(kg/m2)	12.50	48.40	23.03±10.18

Table 3 shows that mean age of participants was 5.196±2.506years, mean height of participants was 37.857±9.099inches, mean weight was 43.186±22.768pounds and BMI was 21.30±7.986kg/m2

Table 3: (Overall)

	Minimum	Maximum	Mean±SD
Age	2	10	5.196±2.506
Height (inches)	24	58	37.857±9.099
Weight (pounds)	17.60	105.20	43.186±22.768
BMI(kg/m2)	12.50	48.40	21.30±7.986

From the analysis it is concluded that on the basis of age for KT group, out of 14 participants 71.43% were of 2-4 years of age, 21.42% were of 5-7 years of age and 7.14% were of 8-10 years of age. Similarly for Non- KT group on the basis of age, out of 14 participants 28.57% were of age group 2-4 years, 50% were of age group 5-7 years and 21.43% were of age group 8-10 years.

While on the basis of gender for KT group, out of 14 participants 57.14% were male and 42.86% were female and for Non-KT group out of 14 participants 50% were males and 50% were females.

Similarly on the basis of BMI, for KT group, that out of 14 participants, 35.71% were underweight, 42.86% were normal and 21.43 were overweight and for Non-KT group out of 14 participants 42.86% were underweight, 21.43% were normal, 7.14% were overweight and 28.57% were obese. Overall out of 28 participants 39.29% were underweight, 32.14% were normal, 14.29% were overweight and 14.29% were obese.

Table 4 shows that in 0 week assessment the mean and standard deviation in KT group is 2.785±0.80 and in Non KT group is2.642±0.49 with p-value 0.5. In 2nd week assessment the mean and standard deviation in KT group is 2.571±0.93 and in non KT group is 2.500±0.51 with p-value 0.8. In 4th week assessment the mean and standard deviation in interventional group is 2.000±0.96 and in control group is 2.285±0.46 with p-value 0.3

Table 4: (Independent T test)

	MEAN±SD		
	KT GROUP	Non KT GROUP	P-VALUE
MAS_0 WEEK_ASSESSMENT	2.785±0.80	2.642±0.49	0.57
MAS_2ND WEEK_ASSESSMENT	2.571±0.93	2.500±0.51	0.80
MAS_4TH WEEK_ASSESSMENT	2.000±0.96	2.285±0.46	0.33

Table 5 shows that in KT group the mean and standard deviation in MAS 0 week, 2nd week and 4th week assessment is

2.768±0.214, 2.571±0.251 and 2.000±0.257 respectively while the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01.

Table 5: Repeated measure ANOVA (KT Group)

ASSESSMENT	MEAN±SD	P-VALUE
MAS_2ND WEEK_ASSESSMENT(2)	2.571±0.251	
MAS_4TH WEEKASSESSMENT(3)	2.000±0.257	0.00
MASS_0 WEEK_ASSESSMENT(1)	2.768±0.214	
MAS_4TH WEEKASSESSMENT(3)	2.000±0.257	0.01
MASS_0 WEEK_ASSESSMENT(1)	2.768±0.214	
MAS_2ND WEEK_ASSESSMENT(2)	2.571±0.251	0.01

Table 6 shows that in the non KT group the mean and standard deviation in MAS 0, 2nd and 4th week assessment is 7.251±0.473, 8.107±0.576 and 8.893±0.548 respectively while the p-value between 2nd and 4th assessment is 0.00, p- value between 0 and 4th week assessment is 0.03 and p-value between 0 and 2nd week assessment is 0-03

Table 6: Repeated measure ANOVA (Non-KT Group)

ASSESSMENT	MEAN±SD	P-VALUE
MAS_2ND WEEK_ASSESSMENT(2)	8.107±0.576	
MAS_4TH WEEKASSESSMENT(3)	8.893±0.548	0.00
MASS_0 WEEK_ASSESSMENT(1)	7.251±0.473	
MAS_4TH WEEKASSESSMENT(3)	8.893±0.548	0.03
MASS_0 WEEK_ASSESSMENT(1)	7.251±0.473	
MAS_2ND WEEK_ASSESSMENT(2)	8.107±0.576	0.03

Table 7 shows that in interventional group the mean and standard deviation in MAS pre, mid and final assessment is 8.214±0.720, 9.143±0.919 and 9.929±0.867 respectively while the p-value between mid and final assessment is 0.00, p- value between pre and final assessment is 0.01 and p-value between pre and mid assessment is 0.01.

Table 7: (KT Group)

ASSESSMENT	MEAN±SD	P-VALUE
ROM_DORSIFLEXION_2ND WEEK_ASSESSMENT (2)	9.143±0.919	
ROM_DORSIFLEXION_4TH WEEK_ASSESSMENT(3)	9.929±0.867	0.00
ROM_DORSIFLEXION_0 WEEK_ASSESSMENT(1)	8.214±0.720	
ROM_DORSIFLEXION_4TH WEEK_ASSESSMENT(3)	9.929±0.867	0.01
ROM_DORSIFLEXION_0 WEEK_ASSESSMENT(1)	8.214±0.720	
ROM_DORSIFLEXION_2ND WEEK_ASSESSMENT(2)	9.143±0.919	0.01

Table 8 shows that in non KT group the mean and standard deviation in MAS 0, 2nd and 4th week assessment is 7.250±0.473, 8.107±0.576 and 8.893±0.548 respectively while the p-value between 2nd and 4th week assessment is 0.00, p-value between 0 and 4th week assessment is 0.00 and p-value between 0 and 2nd week assessment is 0.00.

Table 8: (Non-KT Group)

ASSESSMENT	MEAN±SD	P-VALUE
ROM_DORSIFLEXION_2ND WEEK_ASSESSMENT(2)	8.107±0.576	
ROM_DORSIFLEXION_4TH WEEK_ASSESSMENT(3)	8.893±0.548	0.00
ROM_DORSIFLEXION_0 WEEK_ASSESSMENT(1)	7.250±0.473	
ROM_DORSIFLEXION_4TH WEEK_ASSESSMENT(3)	8.893±0.548	0.00
ROM_DORSIFLEXION_0 WEEK_ASSESSMENT(1)	7.250±0.473	
ROM_DORSIFLEXION_2NDWEEK_ASSESSMENT(2)	8.107±0.576	0.00

DISCUSSION

The independent T test showed that the results in MAS score between KT group and non KT group in 0, 2nd and 4th week assessment were non-significant with the p-value of 0.57, 0.80 and 0.33 respectively and among non KT group and KT group 0, 2nd and 4th week assessment in ROM dorsiflexion the results were also non-significant with p- value 0.40, 0.07 and 0.059 respectively. Repeated measure ANOVA showed that in MAS score of non KT group the results were significant with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.03 and p-value between 0 and 2nd week assessment is 0.03 while in KT group the p-value between 2nd and 4^{th}week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01. Repeated measure ANOVA in ROM dorsiflexion in non KT group shows the significant results with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.00 and p-value between 0 and 2nd week assessment is 0.00 while KT group also showed significant results with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01.

Another study conducted by on effects of kinesio taping on body functions and activity in unilateral cerebral palsy included 37 children with unilateral cerebral palsy were presented on November 2009-october 2013 with age between 7-14 years. The results showed significant results in muscle power sprint (p=0.003), lateral step-up test (p=0.016), sit to stand (p=0.018), attain stand through half knee right (p=0.003), BOTMP Gross scores (p=0.019), and WeeFIM total (p=0.003) and self-care score (0.022) between groups the p-value was less than 0.5(p<0.05).[18]

Another study conducted by kora AN and colleagues muscle inhibitory vs corrective kinesio taping on gross motor abilities in children with spastic cp. 32 patients from outpatient department were selected for this purpose. The results of the study revealed there statically and clinically there is no difference in results. [19]. our study showed that the results are significant with the p-value between 2nd and 4th week assessment is 0.00, p- value between 0 and 4th week assessment is 0.01 and p-value between 0 and 2nd week assessment is 0.01.

A study was conducted on effects of kinesio taping of lower limb on functional mobility, spasticity and Range of motion of children with cerebral palsy was conducted. Total of 30 cerebral palsy children were included with age group of 3-10 years. The result showed that the short term application of kinesio taping do not show any significant results in ROM, spasticity and functional mobility with p-value p=0.58, p=0.317 and p=0.320 respectively, however long term use had significant results on ROM, spasticity and functional mobility (p<0.05).[20] Our study showed that the results are significant with p- value between 2nd and 4th week assessment is 0.00 , 0 and 4th week assessment is 0.01 and p-value between pre and mid assessment is 0.01.

CONCLUSION

Null hypothesis is accepted

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